The Executive's Guide to Mastering the Web in Business

WEBMASTER

Vol.95

June 1997

Ford's Better Idea

WHEN CHAIRMAN ALEX TROTMAN DECREED THE WEB WOULD BE THE WAY, FORD'S INTRANET TEAM HIT THE ROAD

Bob Moaulka and Mike Ledford are driving the Ford effort

ALSO INSIDE:

Can CIOs And Webmasters Live In Peace? *Page 50*

The Web As Collaboratorium *Page 44*

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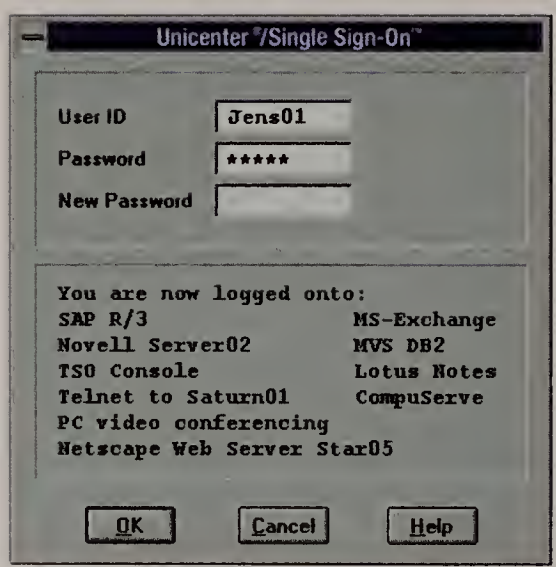

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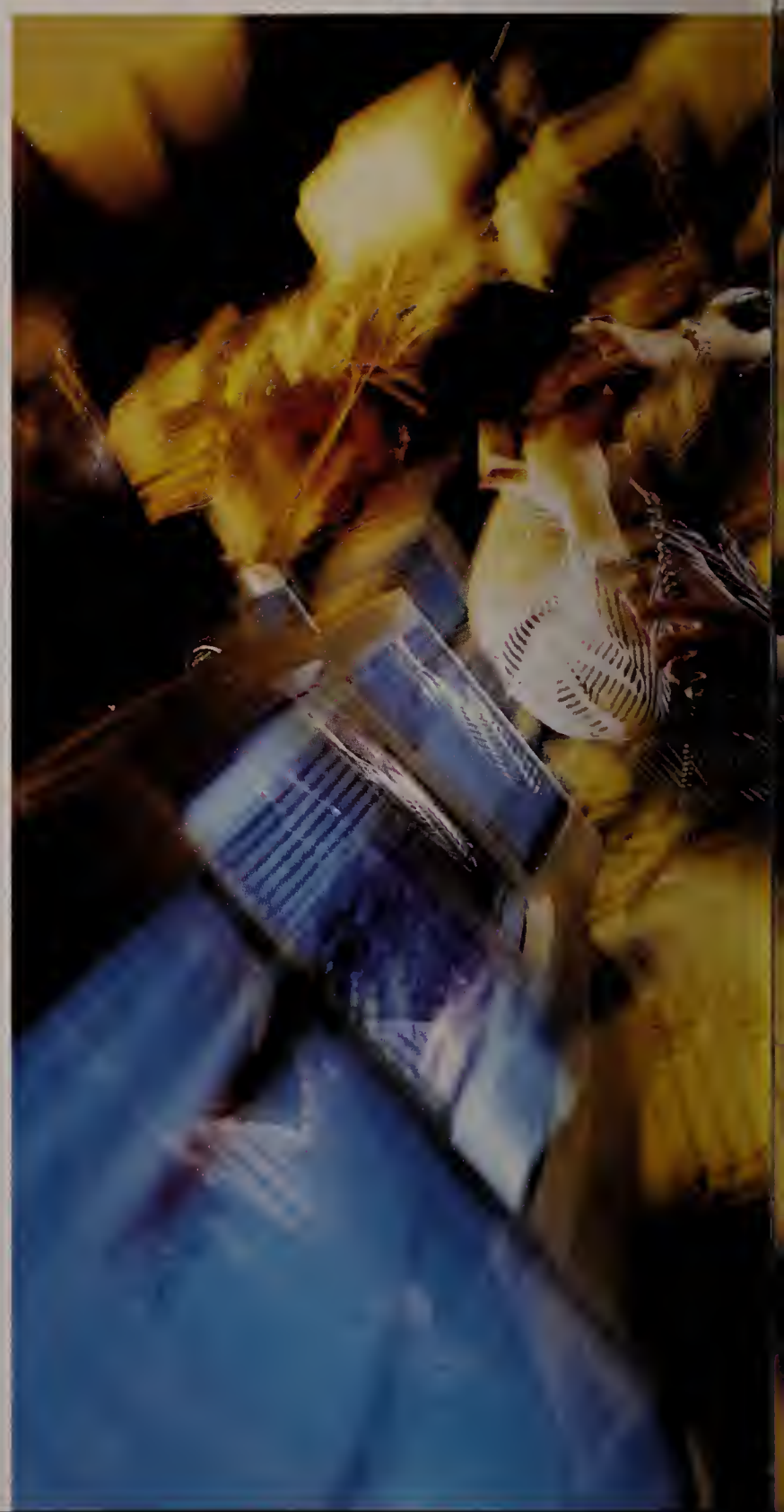

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WEBMASTER®

June 1997
VOLUME 1, NUMBER 12

FEATURES

Under the Hood at Ford

26

▼ This automaker built an intranet to serve 80,000 employees and steer the company into the future.
By Anne Stuart

The Next Dimension

36

▼ In industries as diverse as manufacturing, sales and advertising, 3-D technology offers a deeper understanding of what users see.
By Fred Hapgood

The Joys of Togetherness

44

▼ It's not soup yet, but the Web shows signs of becoming the most powerful collaborative environment out there.
By Heath Row

Web War

50

▼ Not really. But when webmasters and CIOs can't resolve their differences, the chaos rivals that of a bad B-movie.
By Carol Hildebrand

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WEBMASTER

DEPARTMENTS

Home Page 6
- ▼ Shoulder to Shoulder

Threads 8
- ▼ How to Win Friends and Influence Business
- ▼ From Bark to Byte
- ▼ Private Parts Management
- ▼ Life Sentences
- ▼ Join the Club
- ▼ Off the Cybershelf

Netrepreneurs 14
- ▼ Paper Tiger

Index 60

Browser 64
- ▼ Meet Me in St. Louis. At 3:30.
- ▼ Doing It the Hard Way
- ▼ A Brighter Forecast
- ▼ Not for Preferred Customers Only
- ▼ Forever Extra
- ▼ Merchant Minded

COLUMNS

Customer Interface 16

The Velvet Glove

▼ How to convince distributed developers that the only limit is not their imaginations.

By Jim Sterne

The Business Case 22

Swimming the E-Channel

▼ A small company heads steadily deeper into electronic-commerce waters.

By Morris Samit

Reporter's Notebook 56

The New Right

▼ The Poynter Institute for media studies' conference on ethics in online journalism raised more questions than it answered.

By Anne Stuart

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Shoulder to Shoulder

When I was in college, we used to play a game in which we would rent three radically dissimilar videos and, after watching all three, try to come up with a common theme. Playing the same game with the contents of this month's issue of *WebMaster* presents no comparable challenge: The subject everyone keeps talking about is collaboration.

Collaboration is one of those things that—outside the context of the Vichy regime—most people would agree is good. It's also increasingly necessary as the problems facing corporations become more complex and the knowledge of individuals grows more specialized. "The new reality is that it will take the collaborative efforts of people with different skills to create innovative solutions and innovative products," wrote MIT's Michael Schrage in his book *No More Teams! Mastering the Dynamics of Creative Collaboration* (Currency Doubleday, 1995) "[The] ongoing co-evolution of collaborative tools and the need to innovate will completely reshape the way organizations create value."

You'd think those new ways of creating value would be a done deal, now that we have the multimedia, cross-platform, do-it-in-real-time Web. But to date, what most companies mean when they say they are collaborating on the Web is that they are communicating on the Web, exchanging information rather than creating a shared understanding, to use Schrage's terms. Yes, they are making information readily available to more people, but working on the same material is not the same as working *together* on the same material. Even the addition of a threaded discussion group or chat area cannot replicate the vital, volatile interactions of face-to-face—or voice-to-voice—work sessions.

The good news for the teaming masses is that companies claim to be pursuing the real McCoy. The bad news is that it may take them awhile to get it. Even Ford Motor Co., which developed an ambitious multiapplication intranet for 70,000-plus employees in just six months, will probably see another couple of years pass before large numbers of people are working together over the system in real-time (see "Under the Hood at Ford," Page 26). And while virtual reality and other "workspace" environments are becoming popular for training and collaborative design, such applications rarely run on the Web, despite the economic advantages of doing so.

That situation will change, however, now that numerous vendors of VRML and CAD/CAM software are preparing versions of their products for the Internet. In addition, Web-based audioconferencing and videoconferencing tools are enabling the meeting of more than just minds. And developers who specialize in Web environments increasingly are tailoring their cyberworlds to meet real-world needs: Instructors at Kent State University, for example, are holding office hours and problem-solving sessions on the Internet's Palace site, which also lets students—represented by two-dimensional avatars—manipulate various props and physically assemble objects in collaborative exercises (see "The Joys of Togetherness," Page 44). Clearly, as the technology improves, we are seeing a lot more next-best things to being there.

PHOTO BY JOHN SOARES

A few organizations, mostly in the high-tech arena, are on the verge of realizing some of the more obvious benefits of Web-based collaboration. ("How's the weather in Helsinki, Floyd? Could you pass me that hammer?") But perhaps the greatest potential lies not

in bringing together dispersed colleagues but rather in creating closer, more organic relationships among business partners. Some of those relationships already are emerging in the collaborative forecasting and supply chain management applications fielded by companies like Heineken USA Inc. and Fruit of the Loom Inc. But even those rely chiefly on information exchange; it will take the addition of true, real-time collaboration to transform improvements into innovations.

Seven years ago, Harvard Business School professor Joseph L. Badaracco Jr. wrote a book called *The Knowledge Link: How Firms Compete Through Strategic Alliances* (Harvard Business School Press) that advocated deliberately blurring organizational lines and allowing knowledge to flow freely among corporate partners. Badaracco defines alliances as "organizational arrangements and operating policies through which separate organizations share administrative authority, form social links and accept joint ownership, and in which looser, more open-ended contractual arrangements replace highly specific, arm's length contracts."

That book, of course, was written several years before the Internet—let alone extranets—gained a toehold in business. Just think how much deeper and richer allies' relationships might become if their employees could meet, greet and labor together in the same spaces and with the same resources, regardless of time, place or operating system. Suddenly, companies that bond briefly over a single project can "share understanding" as fully as long-term partners; and partners can progress from the familiarity of information passers to the intimacy of co-workers. The payoff is not only an increase in productivity but—more importantly—an increase in knowledge, which is "a social product, the result of interactions among people," in the words of Badaracco.

Knowledge. Collaboration. Flexible relationships. All those things we're supposed to have been striving for lo these many years.

Maybe they're finally within reach.

Leigh Buchanan

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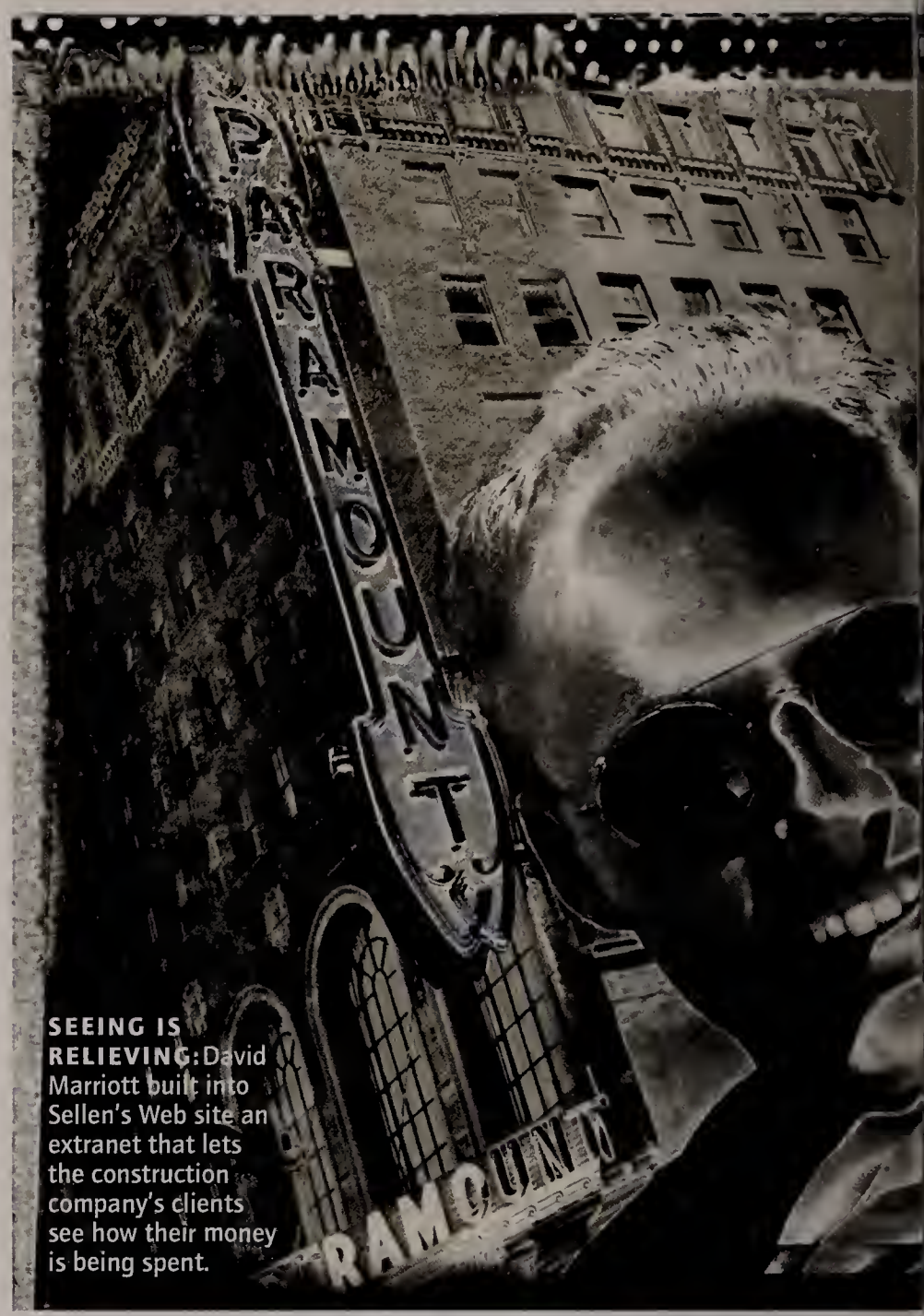
PROFILE

How to Win Friends & Influence Business

THE SELLEN Construction Co. Inc. (*www.sellen.com*), a 400-person outfit that tackles such large-scale projects as the renovation of Seattle's historic Paramount Theatre, has long thought that building sturdy relationships is just as important as building sturdy buildings.

"We know we're in the construction business," says David Marriott, Sellen's MIS technical assistant and webmaster. "But we are also in the information business, or at least the business of keeping the client informed."

To help achieve that goal, Sellen launched a Web site 18 months ago that—thanks to the company's promotional department—did a fine job of showing off Sellen's past performance and current offerings. From the beginning, says Marriott, the site earned the admiration of other construction companies, whose managers called or sent e-mail complimenting the work and asking how Sellen did it. (With a great deal of relatively inexpensive labor—his own—plus lots of encouragement and an overriding decree from top executives, Marriott would reply.)



SEEING IS RELIEVING: David Marriott built into Sellen's Web site an extranet that lets the construction company's clients see how their money is being spent.

But industry kudos weren't enough. "The package had to be a viable business investment," explains Marriott. "It couldn't be just a cool idea or a way to jump on the high-tech bandwagon."

That need to deliver value and the desire to stay close to customers compelled Marriott to create an Online Projects extranet. The extranet, which links from the main site but requires a password, lets Sellen clients access secure databases in which they can review progress reports on their projects, read the minutes of meetings, view change-order

From Bark to Byte

Market rates for outsourcing the conversion of a 300-page text to a digital format:

$75	Scan pages into digital pictures of text that cannot be manipulated or edited.
$120	Scan pages into electronic text using optical character recognition and correct misread words by hand. This results in text that can be manipulated and edited.
$600	Keying (typing in the entire text).
$900	Keying and encoding the text in HTML.

SOURCE: *The Scientific American*, March 1997

PHOTO BY DAVIS FREEMAN / ILLUSTRATION BY OCTAVIO DIAZ

and information-request logs, and even see photographs of their construction sites. Marriott updates those files when he receives new information from construction site managers—at least once a week.

"Clients like it," says Marriott. "It lets them know how their money is being spent."

Unlike some companies, which erect project-specific sites primarily for the convenience of internal project managers (see "Private Parts Management," at right), Sellen created its site almost entirely for the customer's convenience. The company's own construction site personnel still communicate over seven WANs, although those communications will also eventually move to the Web. "At this point, we need to work through some security concerns," says Marriott. "We work with a lot of contractors, and the construction business is very slow at getting into a more Web-based way of doing business."

For now though, the Online Projects extranet is plenty rewarding all by itself. How rewarding? When Sellen won the contract to construct Microsoft Corp.'s St. Andrews campus, the software giant attributed the deal to Sellen's emphasis on communication—including the Web site.

The only downside, says Marriott, is that out of respect for Microsoft, his boss asked him to remove the site's Netscape banner.

–Art Jahnke

Private Parts Management

It was Woody Allen who decided that 90 percent of life was just showing up. And it was Anne Mason who decided that 90 percent of the success of a billion-dollar project that Northern Telecom Ltd. was doing for Sprint PCS would be getting all the parts to show up. On time.

Mason, a senior manager for solutions delivery in Nortel's Richardson, Texas, office, was called on to simplify the customarily nightmarish procedure by which account teams working in the field changed orders for the hardware needed to get the job done.

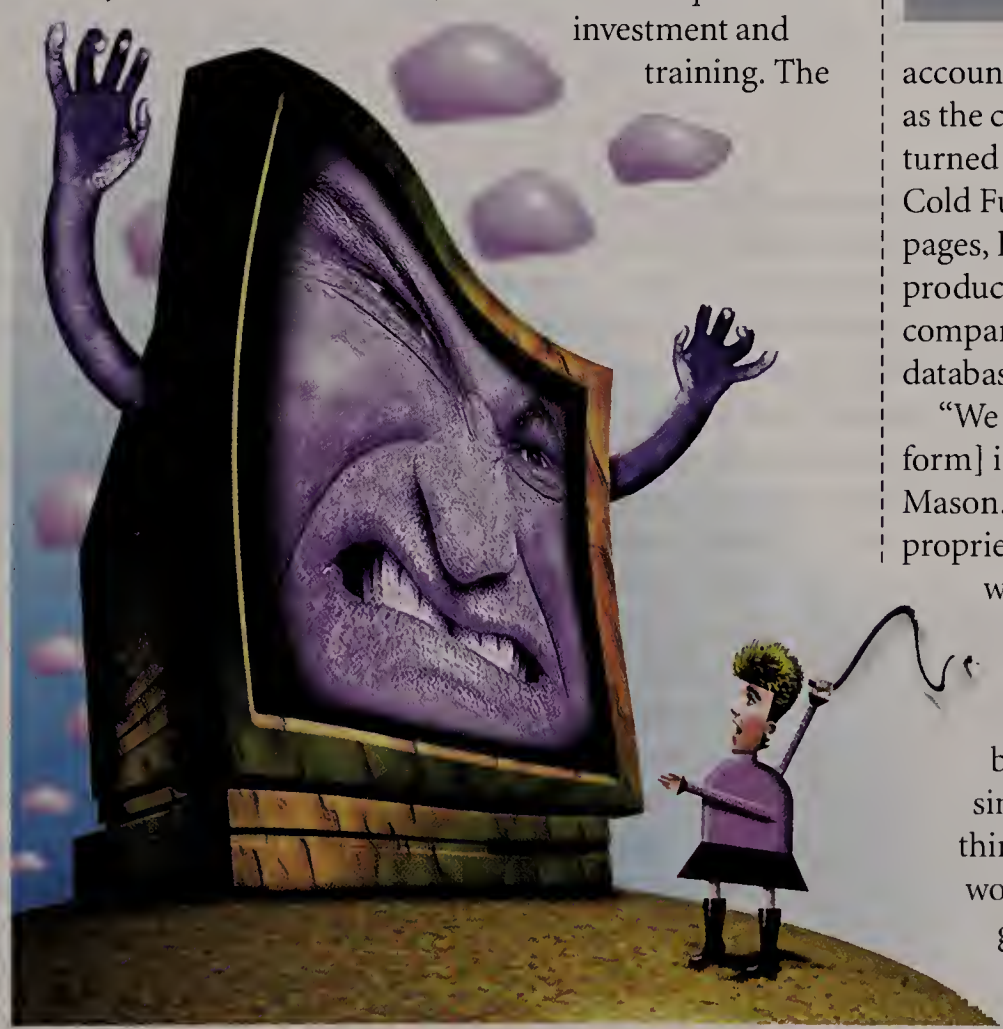
The application, says Mason, had to be lean and responsive, and it had to connect field workers at 17 far-flung sites and two major Nortel offices with databases in Raleigh, N.C.; Ottawa, Canada; and Richardson.

"A couple of years ago, we would have used a proprietary client/server system," says Mason. "And we would have had to do the whole thing twice—once for the Macs that we use here and once for the Windows environment used by the people out in the field."

This time around, Mason built a change-order management system on Nortel's intranet, a move that not only saved her the labor of building the same system twice but also required little investment and training. The account team used Netscape as the client, and Mason turned to Allaire Corp.'s Cold Fusion to build the pages, largely because the product could access all the company's back-end databases without a burp.

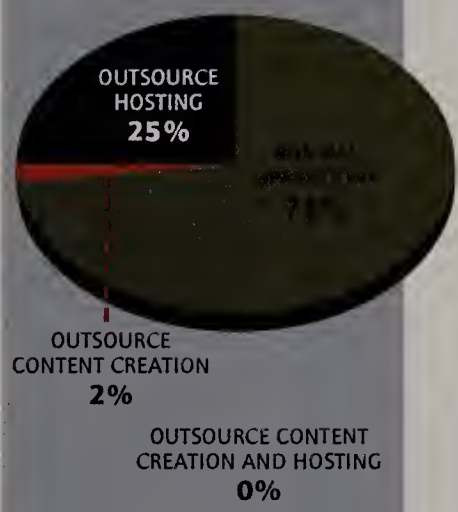
"We built [the one platform] in three months," says Mason. "If we had used a proprietary technology, it would have taken six to nine months," and the company would have had to build two. "This was a simple one for us. I think the customer would agree that they got tremendous value for it."

–Art Jahnke



Don't Try This At Home

PERCENTAGE OF COMPANIES OUTSOURCING SPECIFIC OPERATIONS



SOURCE: *Bell Communications Research Inc. (Bellcore), which supplies research, networking software and consulting services for the regional Bell operating companies. These numbers are based on a survey of 160 webmasters, managers and consultants.*

Join the Club

SO MANY Internet-related organizations, associations, foundations, consortiums, guilds, networks, communities and societies have sprung up recently that they've earned their own Yahoo category (*www.yahoo.com/Computers_and_Internet/Internet/Organizations/*). Here's a sampling:

CommerceNet Consortium (*www.commerce.net*): an industry association for online market and business development. Its mission is to accelerate the growth of Internet commerce and create business opportunities for its members. Activities include an Internet growth survey, development of security and payment protocols, pilot business projects and advocacy on issues such as cryptography export controls and digital signature legislation.

Computer Professionals for Social Responsibility (*www.cpsr.org/dox/home.html*): an alliance of computer scientists and others concerned about the impact of computer technology on society. This organization works to influence decisions regarding the development and use of computers on issues such as the National Information Infrastructure, civil liberties, privacy, workplace concerns, education and community networks.

Electronic Frontier Foundation (*www.eff.org*): a civil liberties organization working in the public interest to protect privacy, free expression and access to public resources and information online as well as to promote responsibility in new media. Activities include legislative and legal advocacy, conferences, online discussions and resources.

Internet Content Coalition (*www.netcontent.org*): a coalition of Net content producers and distributors whose primary role is to help create a responsible and business-friendly environment through advocacy, education, standardization and policy. Activities include networking and promotion of publishers' interests, particularly regarding the Communications Decency Act.

Internet Society (*www.isoc.org*): an international organization for the technical, economic and policy development of the Internet. Activities include Internet standards development, political advocacy, legal and ethical initiatives, education and an annual conference.

World Wide Web Consortium (*www.w3.org*): an organization dedicated to global Web interoperability. Activities include establishing technical standards, maintaining Web information for developers and users, providing demonstrations of new technologies

Life Sentences

British marketeer and publisher Julian Eagles wonders if the costs of producing an intranet-delivered magazine could be covered by advertising revenues. And he hopes to find out with a periodical called Life's Work, which combines content gleaned from a client company's corporate public relations department with general interest stories provided by a network of freelance writers.

Certainly, the price is right. The intranet magazine, produced by Eagles' company, WildKat Entertainment Ltd., is free to corporations that don't mind exposing their employees to advertisements. And companies will have another incentive to sign on: Eagles' model calls for them to share 20 percent of the revenues generated by advertisements on their sites. Advertisers get a similarly attractive deal: They don't pay a cent unless someone clicks through their spiel. How targeted can it get?

"Quite," says Eagles. "For example, you could send an ad for a new car only to those people whose corporate auto lease was coming up in the next three months. "For years, advertisers have been searching for a way to present information to a target audience," says Eagles. "This is a revolution in magazine publishing."

The service is in a trial period right now, with rollout scheduled for September. ***–Art Jahnke***

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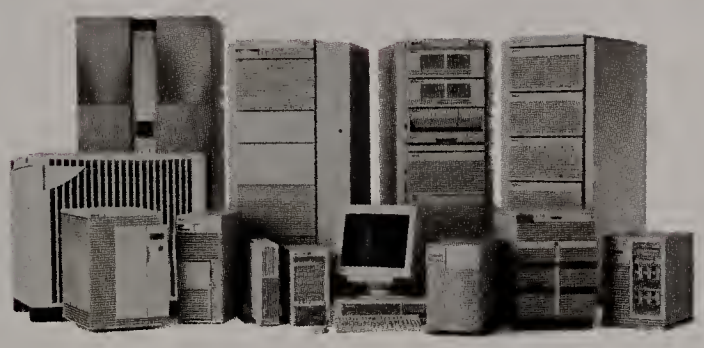

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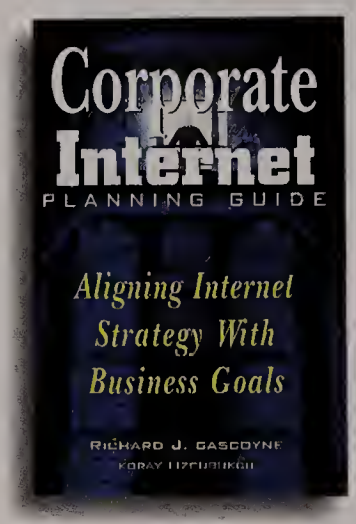
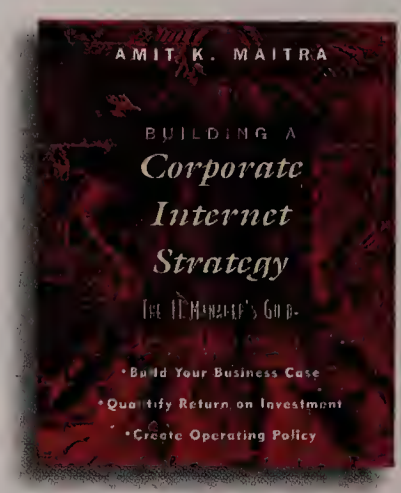
Off the Cybershelf

CULTURAL PUNDITS of late have been wringing their hands over a surge in the publication of sordid memoirs and what the public's apparently voracious appetite for them says about our society. By the same token, e-commerce fans should be heartened by the Web and Internet books that are now coming to market. The days of navigation guides, cool-site compilations and "10 Steps to a Successful Web Presence" primers are passing; in their place comes a spate of serious books about doing serious business online.

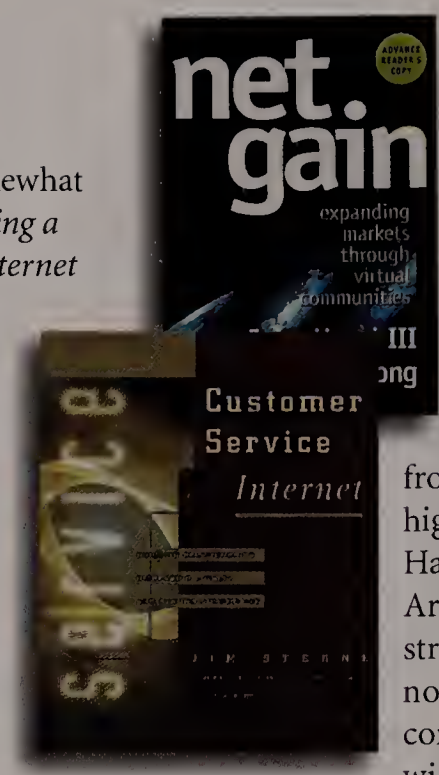


To see how far we've come, readers need only look at the opening chapter of Richard J. Gascoyne's excellent *Corporate Internet Planning Guide: Aligning Internet Strategy With Business Goals* (Van Nostrand Reinhold, 1997). As recently as last year, most Web experts argued that companies should rush to the Internet because the first-shows would grab all the glory. Gascoyne's reasons for striking early are far more substantive: Doing so allows companies to, among other things, test profit models, drive standards, establish early alignments with optimal business partners and restructure the organization to operate within new business models.

Planning Guide's strength is that it prompts corporate leaders to ask the strategic question, "What can the Internet do for my business?" rather than the reactive, "What can my business do on the Internet?" Toward that end, Gascoyne guides his readers through old and new business assumptions about everything from customer relationships to profit models and explains, in bottom-line terms, what the Internet changes and how companies can best exploit those changes. And how refreshing it is to read—after years of "be there or be square" arguments—such logical truths as, "[An] effective Internet strategy must be fully and thoughtfully embraced, aligned with your business strategy and independent of competitors' actions."



Planning Guide is one of the best books out there for business leaders of all stripes, including CEOs. Several other volumes have a narrower focus but still treat Web business with the gravity it deserves. Amit K. Maitra's somewhat sparse *Building a Corporate Internet Strategy: The IT Manager's Guide* (Van Nostrand Reinhold, 1996), for example, is a more nuts-and-bolts treatise that nonetheless contains an in-depth, management-centric discussion of measuring Internet ROI. Jim Sterne, meanwhile, segues from the way-oversubscribed marketing field (which by now harbors more titles than the Hardy Boys series) into the related area of customer service. And even if a substantial chunk of *Customer Service on the Internet: Building Relationships, Increasing Loyalty and Staying Competitive* (John Wiley & Sons Inc., 1996) is devoted to the wonder that is Cisco Systems Inc., well, so what? Cisco exploits the Web so effectively that it could stand as a role model for service-minded companies everywhere, and Sterne's book is smart (and entertaining) about why that is so.



Addressing those subjects from a somewhat higher plane, John Hagel III and Arthur G. Armstrong take the notion of virtual communities, widely considered a social phenomenon, and demonstrate how they can be applied to business. *Net Gain: Expanding Markets through Virtual Communities* (Harvard Business School Press, 1997) explains how Web sites that feature user-generated content, promote personal relationships and include mechanisms for profiling community members are best positioned to make money from those who love them. True, many sites discussed here appeal primarily to consumers, but the advantages of this model for the business marketplace are clear.

Of course, the best business leaders are those who can not only interpret the present but also imagine the future. Wannabe visionaries will want to read Michael L. Dertouzos's *What Will Be: How the New World of Information Will Change Our Lives* (HarperEdge, 1997), the perfect book for executives who have the Internet all figured out and now want to try something hard.

–Leigh Buchanan WM

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I R O N L G H T

Paper Tiger

ONLINE STATIONERY SHOP iPRINT LOWERS COSTS BY LETTING CUSTOMERS HELP THEMSELVES **BY HEATH ROW**

BEFORE iPRINT INC. *(www.iprint.com)* opened for business on Dec. 30, 1996, executives at the Web-based print shop wanted to be sure their user interface and ordering procedure were flawless. The company already had several things going for it, including low prices and plans to offer a full line of business stationery. But President Royal P. Farros and Director of Technology David Hodson believed that to beat out commercial printers moving to the Net, they would need the quickest, most accurate, least painful order and transaction processes online.

So they asked their mothers for help.

"The opinion I get from a usability expert can be totally different from the opinion of a user," says Hodson, a former electronic commerce specialist at Visa International Service Association and a senior project engineer at Deluxe Corp., the largest check printer in the United States. "I sat my mom down to see how she used iPrint. Royal's mom even checked it out."

By watching their friends and families interact with iPrint, the company's managers were able to tweak their service to make it as easy to use as possible. And mother, apparently, does know best: Since January, the 14-employee company had increased its dollar sales by almost 50 percent.

Part of iPrint's appeal, of course, is low pricing: The company's customer self-service model allows it to offer products at 25 to 50 percent less than its non-Web-based counterparts do. In traditional commercial printing, customers order business cards, letterhead and other products by filling out forms at stores or in catalogs, or by placing a call. Orders are then entered into a printer's accounting and order processing systems as well as into a layout computer, on which they are designed, edited and proofread by the printer's staff. As many as 45 to 50 people may handle a single order. That system offers numerous opportunities for error: In a traditional printing business, between 5 and 15 percent of customers request their jobs be redone because of mistakes, according to Farros, a former vice president at Deluxe.

iPrint relieves printers from the "preflight process"—the steps before an order is printed—as well as from the associated costs. "[The preparatory work] is people-intensive, and it has to be," says Farros. "There have to be backups to backups to backups."

But the Web model makes those backups unnecessary. By letting customers place and proof their own orders, iPrint saves between 25 and 50 percent, according to Farros. "Any time you have to do anything manually, the costs go way up," he says. "Printing is very commodity-oriented, and everybody beats everybody else up over pennies. I would rather save 20 cents than do another project for $1."

PHOTO BY KENT HANSON

TODAY, iPRINT customers can design and order their own business cards, letterhead, envelopes, and rubber and self-inking stamps on the site, and the company plans to roll out labels, business forms, memo pads and sticky notes soon. The application for business cards, the first product to go online, features a WYSIWYG interface that allows users to choose from 40 templates. (There are also 40 letterhead and 28 envelope templates.) Users enter their information, move blocks of text around the card, upload their own logos and graphics, and proof the final design before ordering. Wells Fargo & Co. and CyberCash Inc. secure iPrint's online payments, with CyberCash authorizing customers' credit before an order goes through.

Much of iPrint's technology is based on work that Farros and his partners did for Deluxe, which in 1994 bought T/Maker Corp., a startup desktop publishing business owned by Farros and several others. Specifically, Deluxe wanted to create stationery-design kiosks that would simplify greatly the manipulation of such content as card templates and clip art. "Every interface that's out there today is based on looking over some-

PRINTING MONEY: iPrint's Royal Farros (left) and David Hodson have seen sales increase by 50 percent since January.

body's shoulder and learning what to do," says Farros. "That's really great, but what if you don't have anyone's shoulder to look over?"

Users enter their information, move blocks of text around the card, upload their own logos and graphics, and proof the final design before ordering.

Deluxe planned to install the kiosks in office supply stores, in banks and next to automated teller machines. The pilot was successful, with office superstore Staples Inc. reporting redo rates of 0.5 percent for stationery orders made through the kiosks compared to 16 percent for orders made the traditional way. Then Deluxe decided to get out of the printing business and into financial services. Farros took his interface technology and left to start iPrint.

While iPrint's interface is the foundation of its business, what happens on the back end is just as important, says Mike Rubin, senior manager for systems integration. The company's IS group must ensure that the electronic image files sent to iPrint's printer, Business Cards Tomorrow Inc. (BCT), fit seamlessly into BCT's existing printing system. "Printers aren't the most technical organizations," says Rubin. "We have to find out what they do and figure out how we can fit into it."

As part of The Enterprise Network of the NASA Ames Technology Commercialization Center, a small business incubator in Moffett Field, Calif., iPrint's two-room office is networked on a 10Base-T LAN. All employees use Pentium-class PCs, and iPrint houses its site on Netscape 2.01 servers. An Oracle database, which is used to store order information, is connected to the Web via open database connectivity (ODBC). Once customers place their orders, iPrint creates Encapsulated PostScript files of the resulting images, compresses those files and transmits them in daily batches to BCT by dialing into the printer's system with a 28.8Kbps modem.

While Farros declines to quote sales figures or site traffic, he says response to iPrint's service has been favorable and that the site's popularity is especially impressive, considering the company has relied on word of mouth for much of its promotion.

The company is also working on partnerships with several Internet service providers and companies that want to co-label or private label iPrint's technology, says Letty Swank, iPrint's vice president of operations. A large regional ISP that Swank declines to identify has approached the company about creating a co-labeled print shop for its customers. In addition, Citibank NA wants to offer iPrint's services to its customers as part of a direct marketing campaign.

"People are looking at the iPrint site and saying, 'This is different. How can we use it?'" explains Swank. "We were waiting for the letterhead so that the whole business stationery complement was there. Now that that's up and running, you should [start seeing] us in lots of places." WM

Heath Row can be reached at hrow@cio.com.

www.iprint.com

The Velvet Glove

HOW TO CONVINCE DISTRIBUTED DEVELOPERS THAT THE ONLY LIMIT IS NOT THEIR IMAGINATIONS BY JIM STERNE

You were the first person to create a Web site for your company. It was fun. You were the first to promote the Web within your company. It was important. Now you are the first to be responsible for the other people in your company who have created their own Web pages. It is daunting.

Remember how you felt when the Web was new, exciting and mercurial? Your job required that you be equal parts technical savant, graphic artist and psychic visionary. The objective went from maintaining the status quo to intentionally stretching the envelope—first into a tube, then into a wormhole. You were leading the way by being the outlaw.

Now that you're at the top of the heap, you're responsible for managing the work of distributed Web developers. They are intent on blowing away tradition and customs to create the new, the unorthodox, the next insanely great thing—just like you were. Now it's your job to keep them in line.

When product managers from the far-flung edges of the company create brochures, direct-mail pieces or magazine ads, it's unlikely the results will look alike. And there's no reason they should. The people who might buy a Kenmore washing machine don't expect the ads to look the same as those for Craftsman tools. Besides, those ads show up in different publications or are mailed to different people. Why should they be similar?

On the other hand, when people come to a Web site, they see all of your products under the same roof. And while those products may be positioned very differently, your pages should include elements to help the consumer recognize that their parentage is the same. A ThinkPad is not the same as an AS/400 is not the same as an S/390, but there should be no question that they all come from IBM.

Your job is to create the high-level, common look of the site. The size and placement of the logo, the color scheme and the general layout of the pages will tell visitors they are still spending time with your company and haven't drifted off to the home of a dealer, distributor or cooperative marketing partner.

ILLUSTRATION BY MARK FISHER

Celebrate Similarity

Last month, this column beat the drum for navigational clarity. This month, the drummer stays the same, but the rhythm changes slightly as the call goes out for consistent navigation across all departments and divisions. Once Web visitors have finally figured out what to expect at the bottom of every page, don't pull the rug out from under them by allowing different divisions to create their own toolbars. Establish a standard set of buttons or a standard implementation of a frame for the index and apply it across the board.

We are discovering that the power and glory of the Web is its ability to deal with a marketplace of one. Toward that end, you should address people in Japan differently from the way you address people in Norway. But there need to be corporate standards and filters to ensure that brand equity is not frittered away and that loose translations don't embarrass the company or confuse the customer. If the division that makes modems insists on a button bar that is distinctly different from that of the group developing mobile phones, where and how do you draw the line? How do you impose and enforce your corporate perspective?

The World Wide Web Consortium, which is forever trying to adopt standards to keep up with a changing marketplace, has incorporated style sheets into the finally recognized HTML 3.2. But even if your authoring tools don't incorporate style sheets as a technical feature, you should adopt the philosophy behind them. Your company's style sheets should include those elements that are dictated by the corporate communications department.

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Has budget been allocated? ❑ Yes ❑ No

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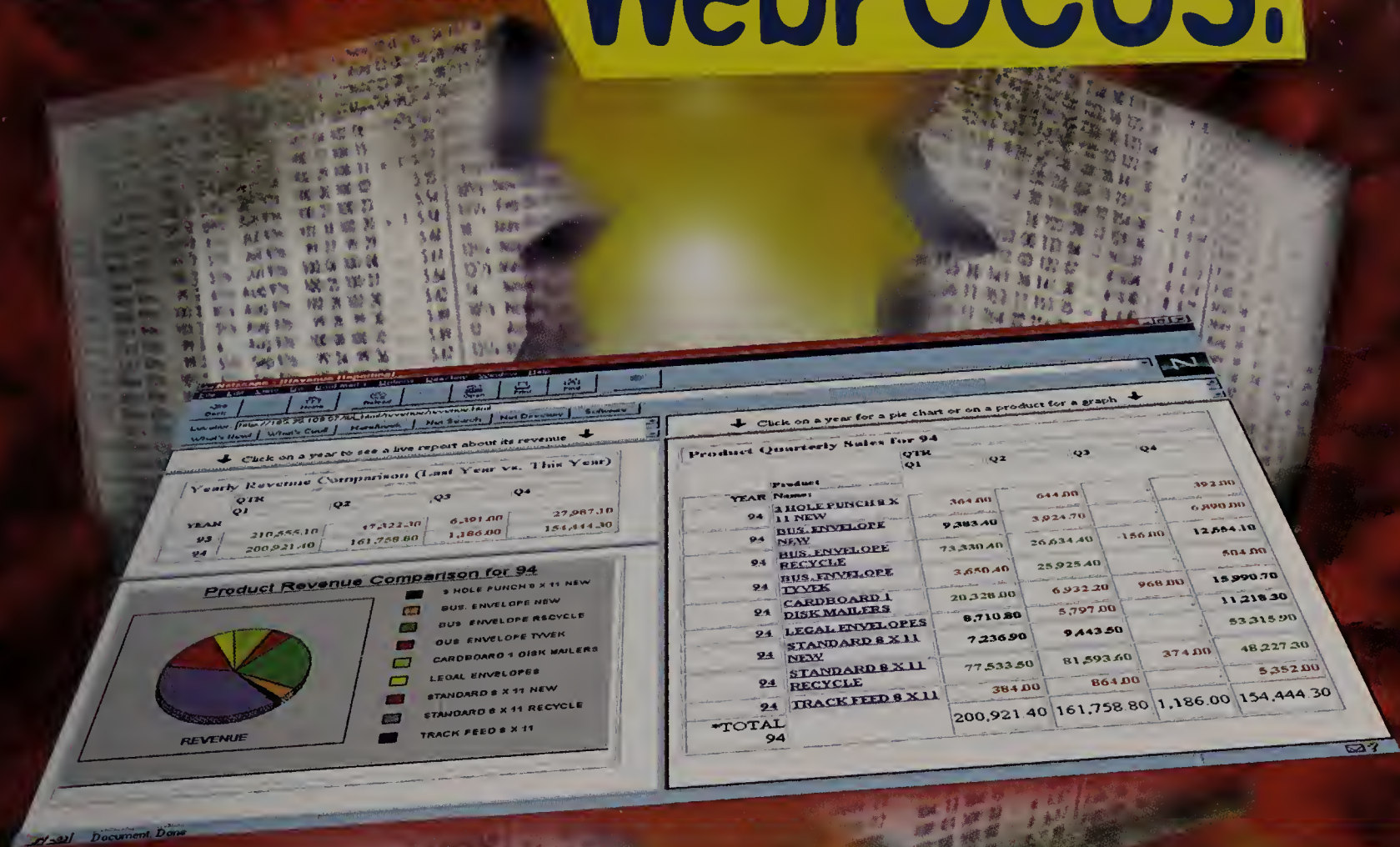

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How should the logo be used? What is the standard, checked, sanitized and approved description of the company?

Convince top brass that a cohesive Web site is important enough to have them sign the rules and regulations cover memo.

What is the corporate color scheme? Add to that consistent navigational devices, and you're off to a good start.

Follow up the imposed corporate standards with corporate guidelines. Suggest helpful techniques or procedures that worked for you when you were inventing the wheel. Recommend common look-and-feel widgets. And then bring out the sticks and carrots.

Of Sticks and Carrots

OF COURSE, THE SIZE, shape and power of the stick is up to you, gentle reader. Each company deals with threats, demotions and terminations in its own way. Nevertheless, you must have something you can wield over the recalcitrant. In some cases, it's tight control of the server: No approval? No hosting. In more distributed organizations, your leverage might be the ability to reach into a server from afar and remove offending pages. It might be the ability to leave a mark in somebody's Permanent Record. Or it might be as simple as, "Remove that link from your home page to our home page or you're fired."

Whatever the penalty, it must have behind it the force of someone sufficiently high up to have power over remote miscreants. That means convincing top brass that a cohesive Web site is important enough to have them sign the rules and regulations cover memo.

But the stick will get you only so far. If you want people to do what you say and bend to your rules, you've also got to plant some really good carrots.

To start with, appeal to common sense. The corporation needs to look like one entity to the outside world; users will be able to navigate better and so on. Then make them some offers they can't refuse, beginning with all the wonderful things that will happen if they use common tools for page development. The most obvious benefits, of course, are training and support. A central team can get to know the products well enough to teach and run a help desk. Developers in individual business units can get up and running faster and won't have to face hours on hold trying to reach manufacturers. The central team can critique dozens of products rather than each business unit doing the Comdex Crawl.

Furthermore, the approved toolset will create pages and graphics in approved formats. As a result, Web work can go live faster. And approved tools and file formats will become doubly valuable when combined with approved procedures. Rather than threaten that the wrong tools and procedures will spell certain death, demonstrate how the proper tools and procedures will promote pages into prompt production.

The Fastest Carrot on the Web

YOUR AVERAGE CONTENT PROVIDER is under the gun: New material must be posted fast and frequently. When marketing department creatives hold a brainstorming session, they want to show off their brilliance immediately. Your job is to show them how—if they use the standard look and feel as well as the recommended tools and procedures—their content will hit the Web at the speed of light. Then add the clincher: Web-based workflow.

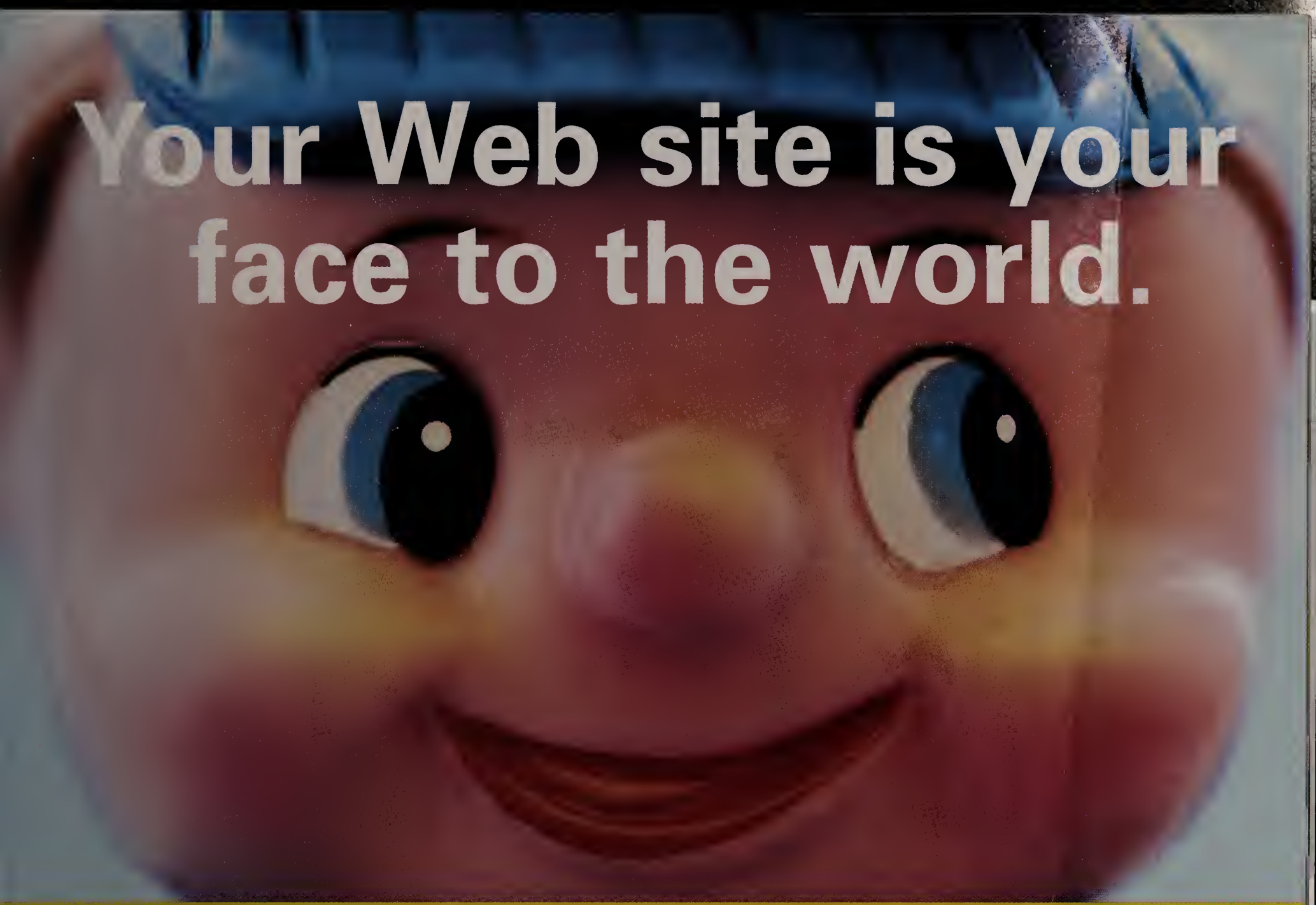
No marketing department—or any other department for that matter—is going to turn down an automated Web content hosting process. Write your copy, tweak your graphics, drag your files over to this browser and drop them in the approval bucket. If it's easier and faster to use the tools and follow the rules, they'd be fools not to do so.

A horse in the wild runs free but is of no value to the farmer or rancher. The horse tethered to a stake cannot run at all and will soon lose its spirit, then its health. But the horse in a corral has enough room to run without running away. Divisional, departmental and business-line page authors and content creators must be treated the same way. Give them enough freedom to express themselves and represent

No marketing department—or any other department for that matter—is going to turn down an automated Web content hosting process.

their products without tying them to a stake. But don't leave them entirely to their own devices. WM

Jim Sterne (jsterne@targeting.com), *president of Target Marketing of Santa Barbara, is an Internet marketing strategy consultant and the author of* World Wide Web Marketing *and* Customer Service on the Internet.



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"does anyone in this company have any idea what's going on?"

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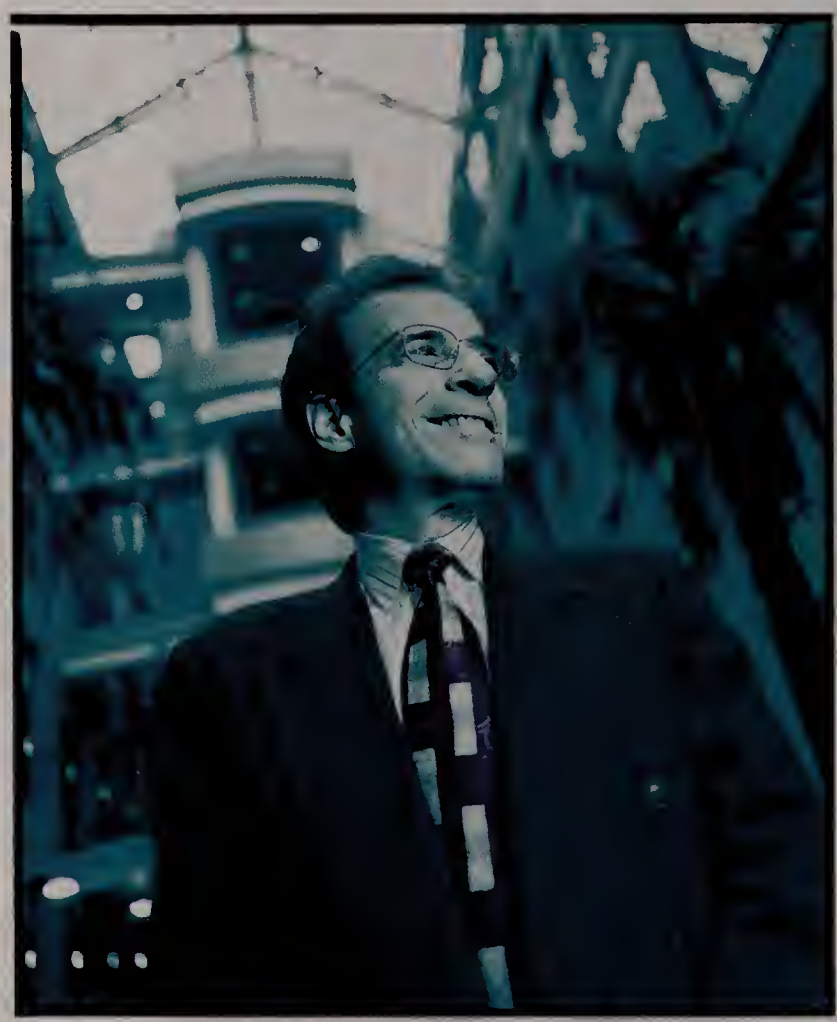
Swimming the E-Channel

A SMALL COMPANY HEADS STEADILY DEEPER INTO ELECTRONIC COMMERCE WATERS

BY MORRIS SAMIT

This is the story of one software company and the World Wide Web. We want to share it because it is a success story and because we know that others in our industry—and in many industries—are also experimenting with Internet commerce and can learn from our experiences. The advantages of Web marketing are so significant—once you iron out the kinks—that it may represent the future of our business.

Thanks to the Web, we're getting fewer leads, and we're thrilled! We're spending less money and making more. Along the way, we've developed a new business model, building a marketing/sales/distribution scenario based on quality instead of quantity.



Our company, DSP Development Corp., makes a product called DADiSP, visual data analysis software for engineers and scientists. DSP's executives, who had read a great deal about the wonders of the Web and believed all of it, launched the company's first site in July 1995. Like most organizations, we believed that the secret to Web success was to post as much information as humanly possible, so we rounded up every brochure, data sheet and image we could lay our hands on, threw in a little color, did some fiddling with layout and shot the whole thing over to an Internet service provider. Presto, we had a Web page! We gave notice to our salespeople, sat back and waited for the calls to pour in.

We waited some more. Then we had an epiphany. Customers don't go to the Web simply to read marketing and technical information, we realized. They want something more, something real. And what could be more real than the product itself?

Our first step toward transforming the site into a true selling channel was to post a demonstration version of the software that users could download. Our strategy in the past had been to mail demo disks to prospects regardless of whether they requested them. But consumers receive many disks from many companies, and they must then be inspired, cajoled or tempted to install the software and take it for a spin. The beauty of the Web is that it lets prospects base their decision to try a product on their assessments of that product's potential benefit to them.

Recognizing that paradigm shift (you can't write an article about the Internet without using the phrase "paradigm shift"), we embarked on a major expansion of our Web marketing activity. We reasoned that if we could get more people to visit our site and get those people sufficiently interested in the product to download the demo, then we had a quick, efficient, inexpensive way to put our product into the hands of "self-qualified" prospects. Within a few months there were more downloads than demo disks being mailed; today we mail disks only in special circumstances.

But the Web isn't just a great tool for attracting individual users; it is also a way to enter new markets. For example, we have always wanted greater penetration in schools and universities, where our software has obvious applications for teaching and research. Unfortunately, the cost of marketing and selling into that market had been prohibitive for us, and the approximately $2,000 list price for the software was prohibitive for many potential customers.

But we knew that schools were interested: Analysis of our user log showed a large number of accesses from .edu ad-

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dresses. That gave us an idea. What if we offered students a slightly modified version of our standard product, one that would not cannibalize commercial markets, free on our Web site? Unlike the demo, the Student Edition would allow users to import and export live files and would offer access to all of the software's functions as well as to online documentation. Students who had a favorable experience with our product while still in school, we believed, would remain loyal customers once they embarked on their professional careers.

We tried it, and it worked so well that we quickly added a mirror site. Then we found that large numbers of faculty members were also downloading the software, so we began offering teachers a full commercial version of the product if their students downloaded the Student Edition for use in class projects. Again, the goal was to expose as many young people to our product as possible.

All of this was accomplished with very little "selling." We executed an aggressive direct mail and telemarketing campaign, alerting major engineering and science schools to the free product on our site. We even visited some universities and hung cards and posters in public spaces. In less than a year, there were tens of thousands of downloads.

But popularity has its price. When we checked the user log, we found that many nonacademics were also downloading (illegally) the Student Edition. Fortunately, we were able to transform that transgression into an opportunity. We contacted the scofflaws by phone (using information we compiled from registration forms), read them their Miranda rights and followed up with a mailing of our literature, including price sheets. Because most of the people were professional engineers and scientists, the Student Edition's small data file size was of limited use to them, but they were excellent prospects for the full commercial version.

In addition, the fact that so many engineers were anxious to retrieve products from the Web led to a strategic selling and distribution decision: We would place the full commercial version on our site and let prospects download it for a 30-day trial. Toward that end, we embedded code that would prompt users to obtain, via e-mail, a password to activate the product. If they chose not to purchase the software at the end of 30 days, it would become inoperable. To date, conversion rates for prospects who actually download the full version approach 50 percent.

There were two benefits from this tactic: reduced telephone time and a shorter qualifying process. Traditionally, salespeople placed numerous phone calls before making initial contact with a prospect and many more throughout the selling process. Now, prospects can review information, download software and test it without ever speaking to a salesperson or waiting for literature to arrive. And, of course, the trial model also eliminates the cost of producing and shipping disks.

DSP's Web site allowed it to enter a market that had previously been prohibitively expensive.

INFORMING OUR PROSPECT base of the software's availability was different from traditional marketing only in that it was more efficient and cheaper. We added our URL to all of our advertising, literature, letterheads and business cards. An expanded direct mail campaign pointing readers to the Web was even more effective. We are continually fine-tuning both our advertising and direct mail efforts, seeking out media that reaches people who routinely use the Internet and conducting sales-to-source analyses to determine which vehicles bring in the most revenues. And, of course, everyone requesting information via fax, mail and so on is directed to the Web site.

We have also created a database of prospects who have taken advantage of the trial offer or requested additional information, and we e-mail those people notices of special discounts, upcoming releases, technical information and new applications. This tactic has proved far more effective than repeated mailings to rented, weak or duplicated lists and has saved us the cost of unnecessary brochures, demos, postage and shipping. The initiative has been so successful overall that we have reinvested the money we saved into new Web marketing initiatives, as well as into development and technical support.

The Web is a software company's dream, creating greater awareness of the brand and 24-hour access to product information while reducing lead, sales and fulfillment costs. At the same time, it is also a user's dream, giving prospects control over what they read rather than forcing on them what we think they ought to read. And having prospects qualify and serve themselves not only saves money for us but also saves users the annoyance of being bombarded with information they don't want. Now when a prospect and a salesperson (yes, we still have them, for the time being, anyway) finally speak, they do so knowing that each has something to offer the other—quite a departure from the typical sales situation. WM

Morris Samit is president of DSP Development Corp. (www.dadisp.com). *He can be reached at* morris@dadisp.com.

What's a Three-Letter Word For...
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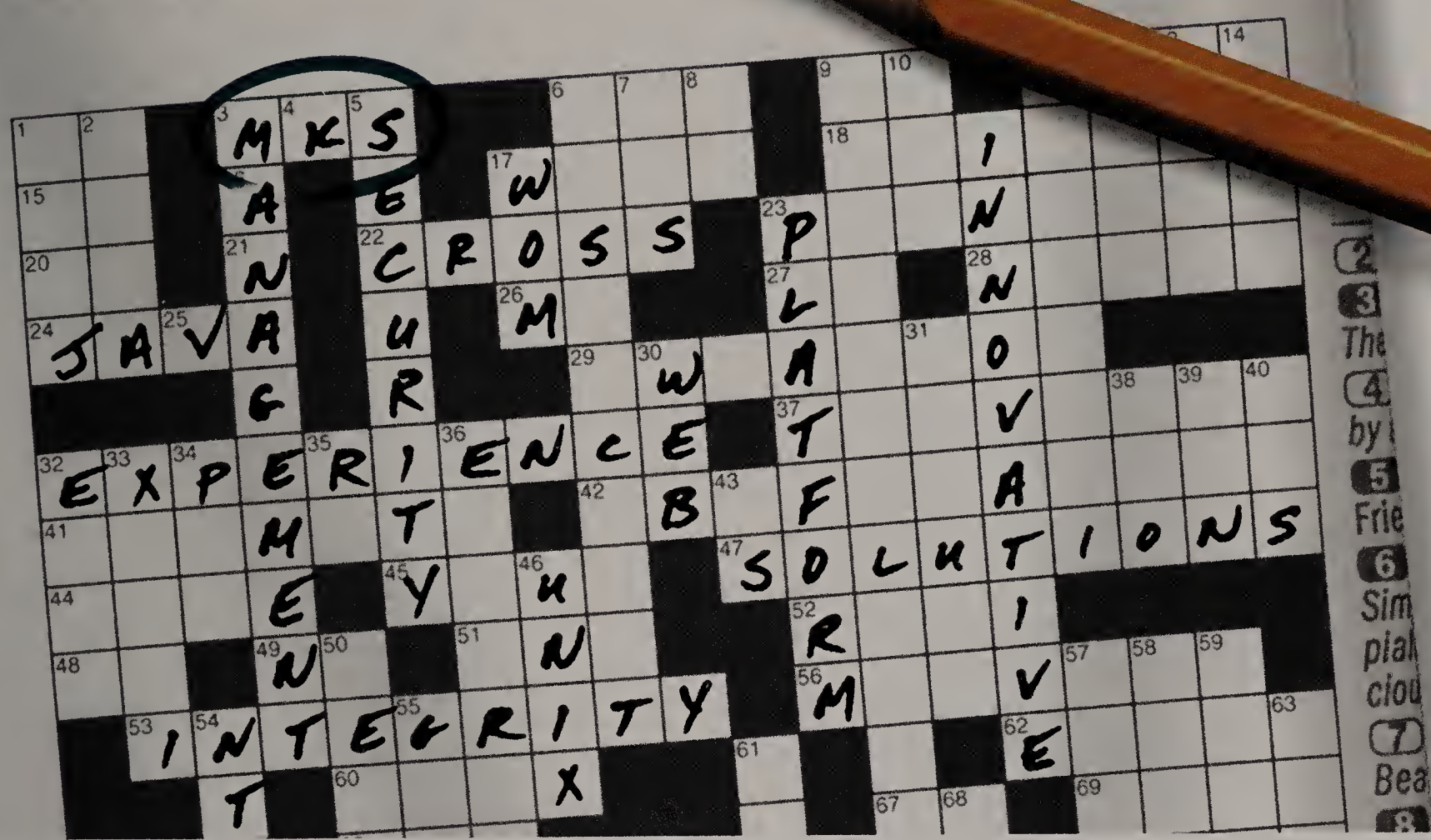

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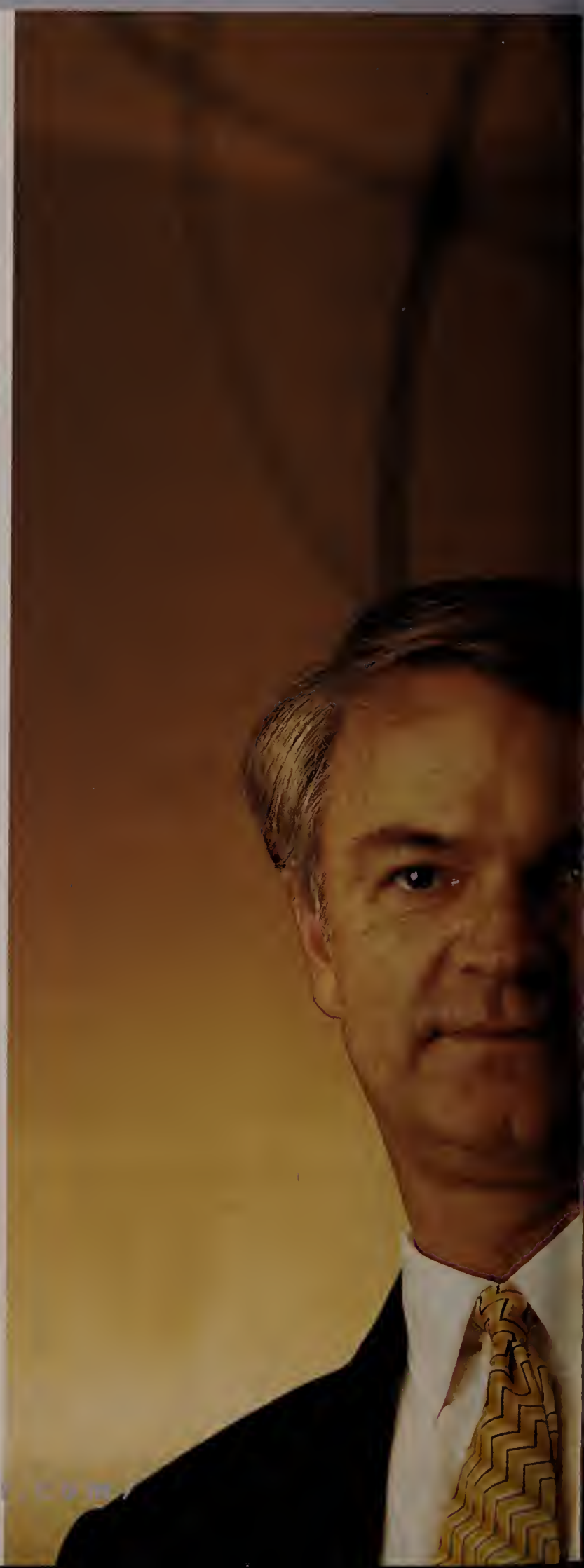
Under the Hood

THEY SPED ACROSS Florida's Alligator Alley in the middle of the night, headed from the Fort Lauderdale airport to an Internet business conference across the state in Naples. They took notes on a laptop computer and talked nonstop about their mission as they'd been doing for weeks back in Detroit. Later, between conference sessions, they ignored the Gulf Coast's beaches, bars and golf courses and instead chose to huddle in a hotel room crafting their concise digital document. When they flew home a few days later, they brought with them the rough draft of a manifesto for revolutionizing the way their company—the world's second-largest automobile and truck manufacturer and fourth-largest industrial corporation—conducted its day-to-day business.

They were a team of true believers from Ford Motor Co.'s fledgling Department of Enterprise Information Management. Their assignment was to develop the underlying strategy—a constitution, really—for a global corporate intranet. The evangelists and their bosses viewed the resulting document—about one and a half printed pages, plus supporting attachments—as the magic carpet that would carry their industrial behemoth, quickly and relatively painlessly, toward new competitive heights.

A little more than a year later, their vision is becoming Ford's reality: an intranet that, so far, connects 80,000 professional employees worldwide, with projections calling for 95,000 users by the end of this year. In an industry in which major technological change sometimes takes years to complete, Ford executives say their comprehensive network has transformed decades-old processes in a matter of months, in many cases letting people disseminate information, share best practices, conduct research, communicate and begin to collaborate in ways they never could before. And even if

Photography By Jon Muresan



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at Ford

This automaker built an intranet to serve 80,000 employees and steer the company into the future

BY ANNE STUART

Corporate Profile
Ford Motor Co.

CHAIRMAN AND CEO
Alex Trotman

PRIMARY INDUSTRY
Car and truck manufacturing; financial services

HEADQUARTERS
Dearborn, Mich.

FOUNDED
1903, with 10 employees

EMPLOYEES
371,702 worldwide in 1996

DEALERS
15,000 worldwide

SUPPLIERS
60,000 worldwide (both production and nonproduction)

RANK
Number two on Fortune 500 list of largest U.S. corporations; world's second-largest manufacturer of cars and trucks (behind General Motors)

REVENUES
$118.1 billion in sales and $28.9 billion in financial services in 1996

RECENT ACHIEVEMENTS
Introduced global car, 1993; launched Ford 2000 globalization initiative, 1995; manufactured 250 millionth vehicle

1996 FORD/JAGUAR WORLDWIDE MARKET SHARE:
12.9 percent

"This is the best thing we've ever seen for capturing knowledge, knowing who's doing what, cutting information and distributing it different ways."

–Bob Matulka

there's still some resistance and results aren't yet quantifiable, Ford's culture, forged in the early years of the 20th century, is evolving into something quite different at the dawn of the 21st.

Enterprise Information Management Supervisor Jeff Balagna remembers sitting in that March 1996 conference listening intently as an executive from another company faltered through a case history of his own organization's Web efforts. "He said, 'We have 200 servers—I think. We have 100 home pages—I think. There's business value to it—I think,'" says Balagna. "He didn't know." The presenter's uncertainty about his Web project's scope, purpose and results cemented Balagna's conviction that an intranet could work at an organization of Ford's size only if it were built on a simple, universally understood strategy.

In finalizing Ford's manifesto, the team made sure every statement boiled down to a paramount goal: "To move to the Ford Intranet as our way of doing business." Period.

Underlying justifications are equally straightforward. As in the rest of the manufacturing world, "competitive advantage is what we're after: better quality, better speed, better cost," says Bob Matulka, director of Ford's Product Development Leadership group. Those goals are particularly important in light of cycle times that, in the highly competitive auto industry, have been reduced from four or five years to less than two. As Mike Ledford, Ford's director of process reengineering, notes: "If you don't have a collaborative network set up, you're going to be at a competitive disadvantage."

"Everybody's moved on to new jobs within the company."

–Stevie Cote

Ford's Intranet Technologies

All home pages are housed at the "Web farm," a highly secure data center in the Detroit area, rather than in individual departments

BROWSER

Site license for Netscape Navigator (*www.netscape.com*), but Ford's dual-browser strategy also incorporates Microsoft Internet Explorer (*www.microsoft.com*)

SERVER SOFTWARE

Netscape Suite Spot

SERVER HARDWARE AND OPERATING SYSTEMS

Primarily the Sun Solaris operating system (*www.sun.com*), with some Silicon Graphics Inc. IRIX (*www.sgi.com*) and Hewlett-Packard Co.'s HP-UX version of Unix (*www.hp.com*)

FORD MANAGEMENT had known for ages that its professional employees, particularly those in product development and engineering, were drowning in documents: technical data, procedures, manuals, memos, meeting minutes, records and more. Visit a typical Ford facility and, throughout the football-field-sized maze of cubicles, you'll see row after row of bookshelves crammed with binders that are in turn crammed with paper.

In addition, the company maintains a document-storage facility at a former factory in Highland Park, Mich., where, one engineering supervisor says, it can take researchers six months to retrieve a requested piece of information from cardboard boxes stacked 15 feet high.

Even people who could find information couldn't necessarily rely on it. That's because a lot of the hard-copy information was outdated, says Stevie Cote, manager of enterprise information management. Team members working on the same project could find themselves using different versions of the same documentation if, for instance, the most up-to-date binder hadn't made it to team members in Canada or England or Australia. Even data in digital form might exist only on one person's hard drive.

So it's no surprise that, when asked through in-house surveys in 1994 and 1995 whether they had access to the information they needed to do their jobs, nearly half of Ford's professional workers said they did not.

Clearly, Ford needed a digital solution.

Technologically, moving to an intranet wasn't a stretch. Ford's global engineering centers had been networked for the exchange of CAD data since the 1980s. The company's external Web site had been launched the previous year, and

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several extranets were under development (see "Other Ford Models," Page 34).

"When the Web really started to take off, we had the infrastructure in place to take advantage of it," says J. Kevin Vasconi, who manages the company's 80-person Internet Applications Development Center.

So with support from top management, including Ken Dabrowski, vice president for quality and process leadership, the evangelists took their message to the people. Ledford, Cote and Balagna visited Ford facilities throughout the United States, England and Germany to give fast-paced presentations with live online tours and a demo showing how one Ford vehicle team was already using the Web to collaborate on research, design and engineering.

"The intention was to inform and educate and get some energy around the project," Balagna says of the road shows. Particularly in Europe, where many employees were seeing the Web for the first time, the awareness campaign exceeded the team's wildest expectations. "You could watch people and quite literally see their mouths drop open," Cote says.

As word spread, so did demand. At each stop, the Web team played to groups as small as 10 or to standing-room-only crowds of 200 or 300 employees three or four times daily for several consecutive days—and they were turning people away at the door. Team members estimate that they met with about 20,000 employees at 75 locations in less than a year.

Part of their popularity was a factor of timing—specifically the preparation for Ford 2000, the company's ambitious reorganization effort. Launched in 1995, Ford 2000 established a single global management team, merged all operations worldwide into a single organization and created five vehicle centers for centralized design, development and engineering.

Previously, Ford's product-development and marketing employees received information from their long-standing in-house networks by telephone or paper. But the global restructuring changed all that. "Now none of those [human] networks are in place; everybody's moved on to new jobs [within the company]," Cote says. As a result, workers now need direct access to information rather than trying to figure out who to call to get it.

Besides, the air was ripe for change. "The whole company was receptive to new ideas," Vasconi says. "There was a high-level interest in new technologies."

Before Ford's intranet debuted in 1996, about 2,000 employees companywide had independently installed browsers and were using the Web.

As department after department signed on, the intranet's global user base grew from that initial 2,000 to 80,000, the digital equivalent of going from zero to 60 in two seconds. Training was easy. Cote estimates that even the newest users learned Netscape in 10 or 15 minutes. As a result, Ford suddenly found itself with an online population larger than those of many American cities and growing much more rapidly. And that community already was organizing itself into neighborhoods.

For all its depth and technical complexity, the Ford intranet features a simple, streamlined design on the enterprisewide home page, dubbed the Ford Hub, that serves as the default home page on all desktops, and on the individual sites tailored for use by teams. All home pages use the same basic template with the same basic design: a logo, a simple site directory in two or three frames and a navigation bar across the bottom. "We're trying to de-emphasize the graphics and emphasize the functionality, just getting the information out there," says Louisa Russo, a supervisor in Ford's Vehicle Center Systems department.

The Ford Hub contains a directory of categories including News, People, Processes, Products and Competition. Pop-

up menus detail what's in each category, keeping the home page uncluttered and reducing wasted surfing time. The menu for the competition category, for example, tells users that's the place to go for information on benchmarking, auto shows, global market information, competitor news, product-cycle plans and patent information. The standard calls for pages to be dated and linked to the author's name and other contact information so that users can send content managers questions, referrals and reminders about keeping content current.

CURRENTLY, THE INTRANET accesses information existing only on internal servers; employees who want to conduct research on external Web sites must receive a manager's permission to venture outside the firewall. Users can find resources through those categories or with a powerful search engine developed by Vasconi's group.

Also online are companywide phone books, training registration forms, maps, building layouts, human resources information, occasional real-time snapshots from auto shows, a PointCast channel with automotive news and stock updates, and text feeds from the Ford Communications Network, an internal closed-circuit television network.

The intranet, the home page of which receives more than a million hits a month, also enhances some employee benefits. For example, the company lets employees buy vehicles at discounts. Before the intranet was developed, workers had to meet personally with corporate sales representatives to make their choices. Now employees can use the site to check their eligibility, click through option packages, compute monthly payments, place orders and check their status. An online paint program that is also available on Ford's external site even lets users see how that Mustang convertible would look in Rio Red or Aztec Gold.

Developers took care to design the intranet so that it would integrate easily with existing applications available on most desktops. For example, "if I develop something in Excel, I don't have to convert it to HTML because I know whoever links to [the intranet] also has Excel," Cote says. Users can pull employee contact information from the company phone book and meeting calendars and other information from multiple company databases, and they can access online libraries and a Web Center of Excellence, which contains information on best practices, standards, recommendations and lessons learned.

But the intranet's real strength is its ability to help users gather a wealth of information that would previously have required several phone calls or a library visit. "This is the best thing we've ever seen for capturing knowledge, knowing who's doing what, cutting information and distributing it different ways," says Matulka.

For instance, in the awareness team's demo, a vehicle team needed data on compressors for climate-control systems in other cars, including competitors' models. Its search of the pilot intranet yielded 18 hits, including other teams' TGW (things gone right/wrong) files, minutes of meetings discussing compressor problems and photos from a "teardown," or a painstaking dissection, of a competitor's vehicle. From their desktops, team members could view the competitor's components from different angles and at different

"The whole company was receptive to new ideas."

–Kevin Vasconi

sizes, and even copy them, mark them up and e-mail them to others. Previously, it would have required a lot of legwork for developers to get other teams' information—if they could even determine that it existed.

The intranet's graphical and multimedia capability has been the greatest value for engineers, who buy heavily into that whole picture-thousand-words equation. "You used to use lots and lots of words to describe something [in e-mail] that can be illustrated with a simple graphic," says Adrian R. Whittle, a project manager in Ford's Transit program, which makes vans for markets worldwide. By allowing people to access images on an intranet from wherever they are in the world, Ford shaves weeks off design processes because project managers no longer have to physically mail masses of product documentation all over the globe.

SITTING AT HIS CUBICLE at the Ford Automatic Transmission Engineering Operations Center, Dennis F. Bayer demonstrates how much easier the intranet has made his life. In the past, Bayer, a unit supervisor, would spend hours chasing after a drawing whose owner could be anywhere in the company. Sometimes drawings were missing; sometimes they could be examined only with a special viewer. Now Bayer just enters the part number "and boom—there's your drawing," he says, as a picture of a driveshaft component materializes on the screen of his desktop PC. Bayer's divisional intranet site also contains information on ISO/9001 quality certification standards, including guidelines, manuals and charts. For Edgar R. Vela, a Taurus/Sable program manager, the intranet has become a way of life. "You check e-mail, you check phone messages, and you check Netscape," he says.

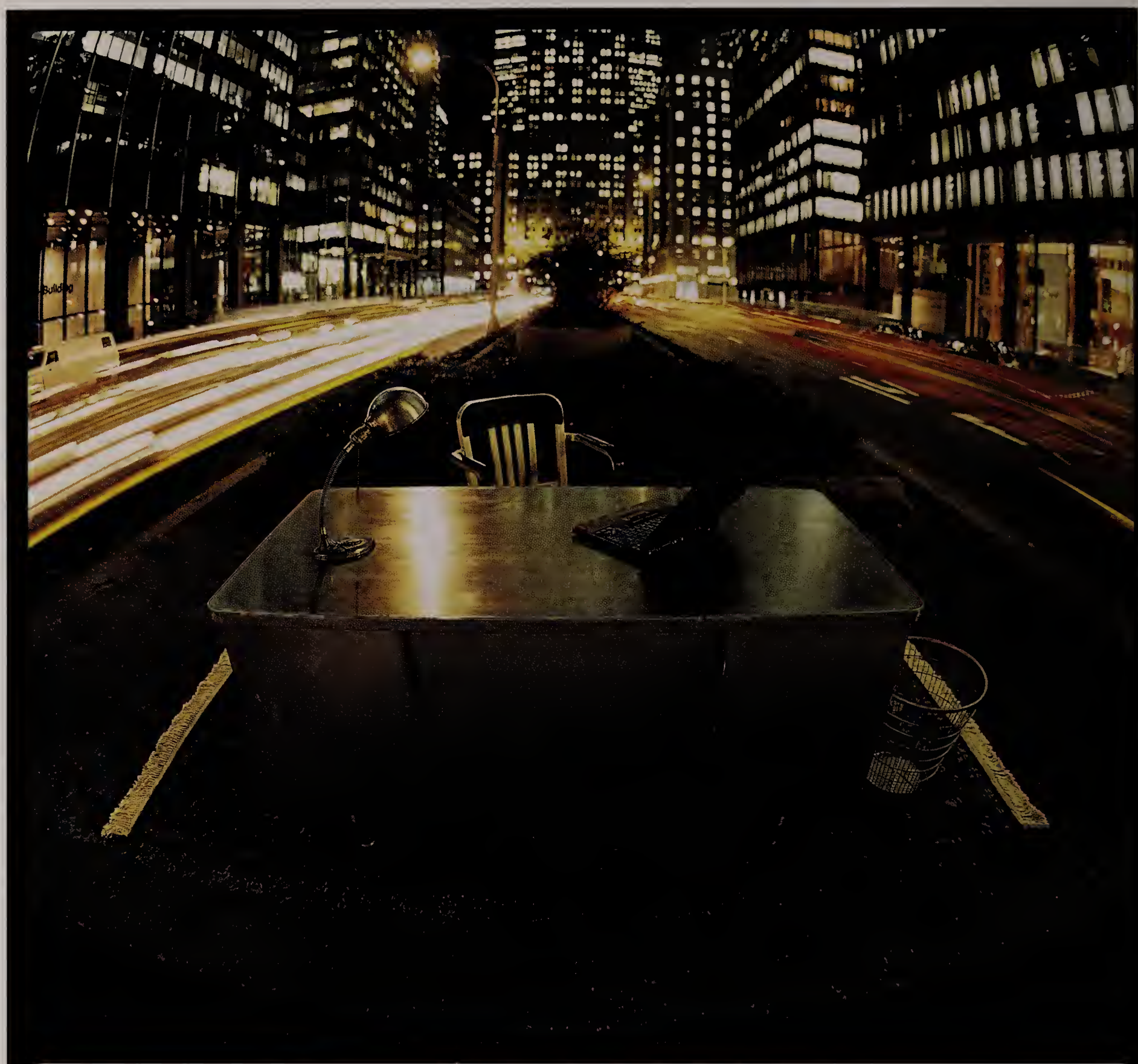
That's because Bill Peterman, webmaster for the Taurus/Sable team, which includes several hundred engineers scattered around the globe, puts everything on the Web. Everything: organizational charts, summaries, status reports, archives, meeting minutes, time lines, brainstorming sessions, procedures, toolboxes, processes, visions, goals, strategies and the stringent documentation for its ISO/9001 certification. "The Web is the master copy," says Brad C. Nalon, another Taurus/Sable program manager. "There's nothing being hidden.... Everybody's on the same page."

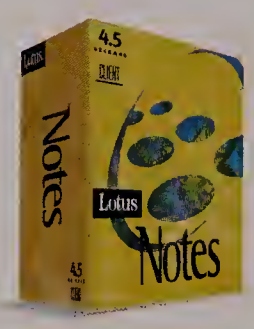
While discussing the intranet's ROI, Vela resorts, as many Ford managers do, to baseball metaphors. "I don't think there are any home runs yet," he says. "They're singles and doubles, subtle changes."

For instance, he and others say, intranet use has improved efficiency, reduced phone calls, all but eliminated redundancy, cut down on mistakes and made a once-honored excuse as obsolete as the Edsel: "We don't get people stepping out of the woodwork at the 11th hour, claiming they never got the latest information," Nalon says.

It's also taken a mighty swipe at paper consumption. Matulka estimates that the information now available on the company intranet would total 30,000 pages if printed—a quantity of hard copy that would be highly impractical if not impossible to manage and distribute through traditional methods.

In addition, Ford managers with international responsibility credit the intranet with letting them "follow the sun," handing off work to people overseas so that progress can continue overnight. "It makes a 20-hour workday manageable," says Joseph R. Hughlett, a quality supervisor in Ford's truck vehicle center.





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Other Ford Models

WHILE FORD'S INTRANET IS ITS MOST AMBITIOUS WEB PROJECT, SEVERAL OTHERS ALSO HELP DRIVE ITS BUSINESS

The automaker's public Web site (*www.ford.com*), which was launched July 4, 1995, receives more than a million hits a day. The main site links to Ford home pages in nearly 70 countries, from Andorra to Yemen. Although they all fly Ford's corporate logo, foreign sites are tailored for local audiences. The United Kingdom's site, for instance, features soccer scores and live video from a major auto show in Switzerland.

On the U.S. site, visitors can view the latest Ford, Mercury, Lincoln, Jaguar and truck models in the online showroom—which, thankfully, has no online salespeople—then look up the closest dealerships by ZIP code. There are also special sections for fans of motor sports, Mustangs and Jaguars (Ford acquired the prestigious British automaker in 1989).

And the public site's "Inside Ford" area offers an extensive corporate history section, news releases, job information, customer outreach material, annual and quarterly financial reports, and a digital version of *Ford Magazine*.

Ford also maintains secure, private, password-protected extranets in which its top-tier design and development suppliers can do business with the company, and journalists who cover the auto industry can get releases, background and images (*media.ford.com*).

Later this year, Ford plans to launch FocalPt, a dealership customer-service extranet. Dealers will be able to use FocalPt to assist with customer financing and track repairs over a car's lifetime. The national network will prove particularly valuable for traveling customers; any Ford dealer will be able to access any Ford product's complete service record faster than you can say "Model T." *–A. Stuart*

Hughlett, who works with people in 11 time zones, says the Web lets him notify his far-flung constituents about major announcements much more quickly and in greater detail than when he worked largely by fax and telephone. "When you make a decision in Belgium, we can disseminate this information worldwide, with picture actuality, by the end of the business day," he says.

It's useful for newcomers, too. Bayer says that new or reassigned engineers can quickly get up to speed on projects by perusing his group's Web site, which includes best practices, an engineer's toolkit, models, and quality systems and engineering reports.

Of course, Ford's road to the future has had its rough stretches. Managers report that some employees, particularly those nearing retirement, are reluctant to invest even a minimal amount of time in learning a new technology or changing their work habits. "It's not that widespread, but it's something we have to overcome," acknowledges Jack Skedd, European manager for information management.

Others remain fearful about break-ins or espionage. That's not surprising in a company so security-conscious that its data center is in an unmarked building and that it requires visitors to obtain a numerical code, which changes daily, before they can exit the parking lot. The fact that Ford's intranet lives on a different server from its external site makes things safer, although Ford outsources the hosting of its Internet presence in order to maximize access for potential customers and not for security reasons, says Vasconi.

Another problem is language: Although English is Ford's official language worldwide, it remains a barrier in some regions, particularly at the company's recently acquired facilities in Eastern Europe. "Anything we put on the Web in English has very little value in these areas," Skedd says.

Finally, the system is not yet as fully functional as some would like it to be. For example, most people still use the intranet primarily for research and for team information repositories rather than working together online in real-time. Today, engineers' chief collaborative use of the intranet is to pull up drawings simultaneously and discuss them on the phone or to exchange e-mails about them. "It is difficult to see us getting to the seamless setting in less than two or three years," Skedd says.

Plans call for the further integration of the intranet into all of Ford's systems and processes. Future application development will be "Web-centric," and the company is starting to do "legacy wrapping" in order to give its mainframes new life, says Vasconi. Ford's intranet will also benefit from the addition of streaming video and audio and the continued stockpiling of information for research, among other things.

As fired up as they are about Ford's intranet, its champions know it will work only as long as it serves the company's core purpose: making and selling cars and trucks. "We've had to think very carefully about what we want to do, what's the value added to the business," says Matulka.

Users say they're just beginning to see the rewards the evangelists promised a year ago. "Really, it's just started," says Mark Tranchant, a British engineer who runs a Web site for a global Fiesta team. "This is really just the infancy of it." WM

Senior Editor Anne Stuart can be reached via e-mail at astuart@cio.com.

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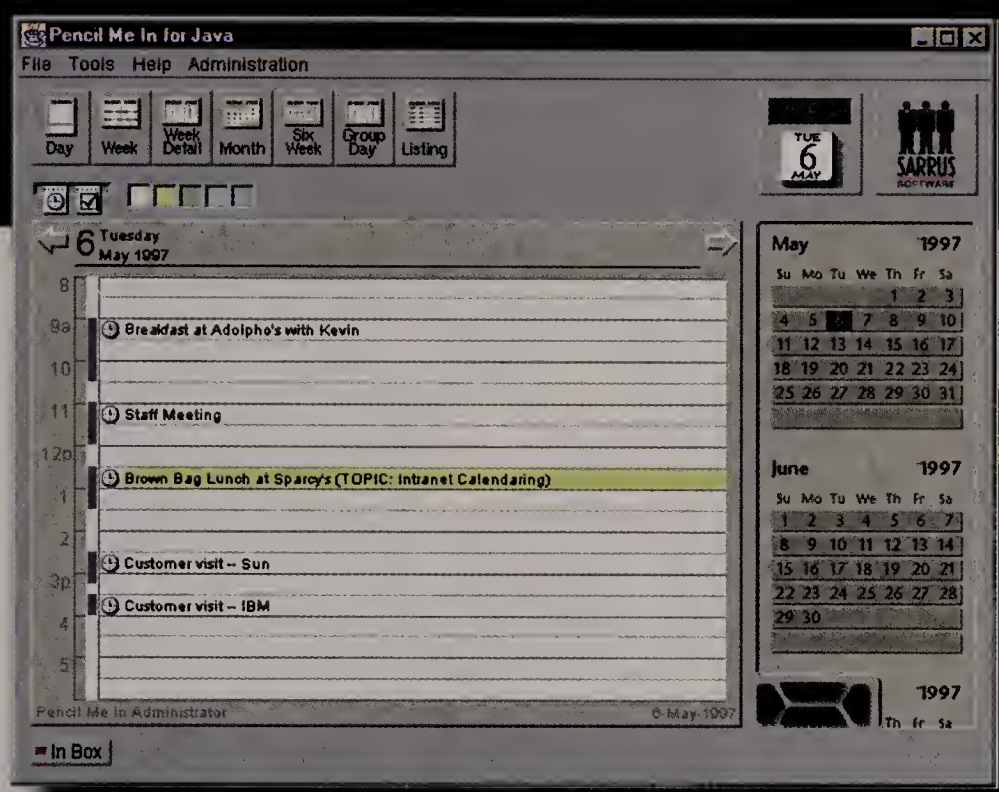

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*As reported by Forrester Research, "The Fortune 1,000 Discovers Java" (Forrester press release dated 1-Jul-96 — http://www.forrester.com/pressrel/MAY96SWP.htm).

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The Next DIMENSIO

BY FRED HAPGOOD

ILLUSTRATION BY RICHARD DOWNS

LAST DECEMBER, Chris Jorgensen, president and CEO of MYski Inc., an Internet-based retailer of winter sports equipment and a prototype retail site for Customized Internet Technologies Inc., enjoyed a flash of fame when he become one of the first to bring interactive 3-D design to the Web. Visitors to his site could pick a template for a particular model of ski, add handcrafted options and decorative motifs, then inspect their selections from various angles and distances by rotating the designs. The site was praised by Bill Rollinson, co-founder and vice president of marketing of the Internet Shopping Network, as being "on the leading edge of the trend away from mass production."

While happy to be noticed, Jorgensen knew that by selling skis, which are about as two-dimensional as three-dimensional objects can be, he had just begun to exploit his site's abilities. This summer he expects to launch another site that will sell a product far better suited to 3-D technology: office furniture. Customers visiting the new site will select basic dimensions for, say, a desk, then choose the material, the color, the number of drawers and so on from a list of options. As those choices are made, an image of the evolving design will appear in another window.

As with MYskis, the model can be viewed from any angle and any distance. When the user is finished, the Virtual Reality Modeling Language (VRML) codes used to generate the image will be transmitted to carpentry machines that cut out the pieces required for the furniture. Those pieces then will be packaged with the necessary connectors and shipped to the user. When the kit arrives, the customer will log back onto the site and, after entering a password, retrieve an image of the box he or she has just received. One click on the box

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In industries as diverse as manufacturing, sales and advertising, 3-D technology offers a deeper understanding of what users see

In 1998, 80 percent of all PCs should arrive 3-D enabled.

and the virtual parts fly out and line up on the screen. Another click, and the first two parts jump up and mate, acting out the first assembly step. The buyer can separate and reconnect them as desired until he is ready to execute that step in real life; then the second assembly step is taken, and so on, until the desk is finished. Jorgensen believes the new technique will lower significantly the price of what he calls modestly customized furniture because no material will be cut until a sale has been made and the customers will be managing most of the steps in the cycle: designing the object, creating the software commands that control the cutting machines and assembling the product.

FOR YEARS, ANALYSTS HAVE suggested that the ability to manipulate 3-D objects at close to the speed of thought would be as significant an extension of the communicative powers of visualization as 2-D graphics were. The evolving VRML standard has allowed developers to put these claims to the test. (VRML is not the only 3-D graphic language, but it is the most widely used.) As a result, the use of 3-D is blossoming in nearly every sector of online activity except e-mail.

Granted, observers might be tempted to think that the marriage of interactive online 3-D and Internet technology is not starting well. Exploring the medium today means running an obstacle course of interminable downloads, zillions of plug-ins (not all mutually compatible but all enormous), incessant browser crashes, clumsy or unintuitive interfaces and ho-hum content. The intrepid navigator must spend hours gathering the tools and skills needed to do things that are not very exciting.

All of that will pass and pass quickly, says Omid Rahmat, vice president of Jon Peddie Associates, a company that monitors digital media technologies.

"Sixteen million 3-D chips were shipped in 1996," says Rahmat. "We expect 42 million to be shipped this year, and in 1998, 80 percent of all PCs should come 3-D enabled. We think that by the end of the decade, 3-D will be taken for granted."

The range of applications envisioned for 3-D technology extends far beyond such obvious ends as gaming and entertainment. It includes training, maintenance, manufacturing, marketing, customer support and management tools. At Lockheed Martin Missiles & Space, for example, a research program is using 3-D simulations to train Navy personnel to operate and maintain gas turbine engines. Duke Power Co. recently has given maintenance personnel and system engineers intranet access to 3-D representations of plant systems. And Northern Telecom Ltd. (Nortel) is running an aggressive program of research on using 3-D technology to improve communication among product engineers, designers, manufacturing engineers and assembly personnel.

"Currently, misunderstandings and requests for clarifications among people working in these groups eat up significant portions of product cycle time," says Jim Smith, senior engineer in Nortel's Physical Design and Technologies Group. In theory, the enhanced powers of visualization that 3-D technology makes possible should reduce the waste due to miscommunication among divisions.

LIKE MANY OF THE WEB'S more sophisticated elements, 3-D content is not cheap to produce, but enthusiasts hope that costs can be kept under control by reusing images in as many contexts as possible. The chain might begin with the stocks of 3-D computer-aided design (CAD) archives built up by the engineers, designers and architects who have been using 3-D CAD systems in-house for years. Within the last two years, specialist CAD houses, such as Autodesk Inc., and generalist software developers, such as Silicon Graphics Inc. with its Cosmo series, have announced programs or features that allow CAD files to be converted into VRML, stored on a server and then attached to various documents.

In theory, "VRML-ized" CAD files can be passed around on the corporate intranet, rotating through such divisions as marketing, manufacturing, assembly, human resources (for training) and maintenance, as well as to such external constituencies as suppliers and prospective customers. Such reuse would allow the original cost of producing the content to be spread across many divisions.

The catch there, industry experts point out, is that once a product comes out of design and moves into the rest of the company, each new use requires that the 3-D image be integrated with a different data set. For example, for many applications, that design must be tied to a list of specific parts. (In manufacturing, a design has no meaning without that list of parts.) Finding and converting those data types, which will be scattered across several databases and stored in several formats, can lead to considerable expenses as well. Reuse is no panacea.

Until the kinks are worked out, the most aggressive application for networked 3-D technology may well be online advertising. Commercial Web sites live in neighborhoods (lists generated by search engines) that are intensely competitive. The only differentiation strategy open to most sites is to improve the quality of on-site experience.

That imperative leaves designers with an insatiable thirst for innovative presentation technologies, and 3-D technology happens to be the latest rage. Most movie sites now

have some 3-D content, often in the form of an interactive game built around the film's plot and characters. And an increasing number of non-entertainment sites have small Java applets that show revolving 3-D icons or logos. Ad agencies, too, are starting to use 3-D technology as a "reward" to encourage click-through on banners, says Adrian Scott, CEO of Aereal Inc., a presence provider specializing in personalized Internet marketing and publishing. Aereal Inc. publishes an online magazine called VRMLSite that contains links to VRML sites Aereal considers to be pioneers. The company also hosts VRML Web sites created by visitors interested in trying their hand with the medium.

PERHAPS THE MOST AMBITIOUS 3-D implementations are virtual worlds, such as the Virtual World Wide Web built by Superscape Ltd., a 3-D development house. A user entering such a world moves around inside a single connected "metaverse," in which the stores, cultural centers and landscape features have stable geometric relationships based on points in a common space. The user wanders through streets (or rides a subway), enters stores and passes virtual shoppers on errands of their own. Clouds, birds and balloons drift across the sky. There are few or no cars, the weather is always room temperature, the sidewalks are uncrowded and the streets are quiet. You have the city to yourself. "The idea is to leave the users feeling so involved they want to stay and explore," says Ian Andrew, president of Superscape.

Superscape's 3-D environment is more than an intriguing place to spend an hour or two. It was designed to attract shoppers, and so far it appears to be working, says Scott Warrender, CompuServe Interactive UK's group manager of commercial services. One of the larger regions in the Virtual World Wide Web, a network of linked virtual worlds, is the VRcade, CompuServe Interactive UK's shopping mall, where visitors can wander around simulations of the famous shopping districts of London, such as Piccadilly Circus and Regent Street. Warrender says the VRcade is pulling four times the hits of an earlier shopping mall, although because other improvements also have been made to the site, it's hard to tell how much of its new popularity can be attributed to 3-D technology.

Over the next several months, Warrender will add person-to-person interactivity so that shoppers can chat with sales clerks, organize joint shopping tours and strike up conversations with shoppers they find beside them, admiring the same goods.

3-D tools are particularly well-suited to marketing products that feature 3-D uses themselves, such as animation or simulation tools. Colt Virtual Reality Ltd., one of the businesses the Virtual World Wide Web links to, sells a TV production tool called the Virtual Production Planner. A visitor wandering into the company's site can use a demo of the Planner to produce a simulated talk show, from designing a set to determining camera angles and positions.

"Historically, set design has been done with pencil and paper and cardboard models," says Neil Reynolds, product manager at Colt. "3-D simulation tools are a revolutionary break with that, and naturally, people are skeptical of them. 3-D demos allow interested parties to see the value of the program directly."

The most ambitious 3-D implementations are virtual worlds in which the user moves through stores, cultural centers and landscapes.

Reynolds says the Superscape site has proved especially useful in opening up markets outside the United Kingdom, in countries where the company had no sales presence at all.

Stefan Hallin, president and CEO of Prosolvia Clarus AB, a real-time 3-D software house based in Sweden, believes the technology is best applied to marketing complex products like cars or toys.

"With 3-D you can show exactly why your airflow system or suspension system is superior," he says. "The client can take the car out for a virtual test drive, run it over a pothole and see the suspension system react."

While this scenario is speculative at the moment, some automobile makers, such as Toyota, allow site visitors to move around inside a panoramic view of any model.

Hallin points out that historically auto dealers have had to carry large inventories to help customers visualize the options available to them and that the carrying costs of those inventories have been significant. He thinks interactive 3-D simulations, perhaps initially supplied through workstation kiosks at the dealership itself and later online, will allow car dealers to cut inventory costs significantly.

THE EXPERIENCE OF TELDOR Wires and Cables Ltd. suggests that VRML can play a role even in sales of relatively simple hardware products. "VRML images for cable manufacturers have two clear advantages," says Eric Lee, webmaster of the company's site. "We are able to show aspects of cable design that just can't be represented in 2-D.

For instance, in 'twinax' cables there's a little strip on the side in addition to the strip connecting the two. There's just no way to clearly represent this in 2-D. And our VRML files are much smaller than the bitmap illustrations they are based on because cables can be represented easily as a series of cylinders."

Lee says the site's VRML pages are the most popular in the Teldor Web site. "If Teldor's Web site has helped make us better known and attracted new customers—and I believe it has—the VRML models have played a role in that success," he says.

3-D technology also is being used to simplify user navigation through, and webmaster management of, large Web sites. When KPMG Peat Marwick LLP was building its intranet, for example, it used 3-D tools to construct traffic monitoring reports. That format made it easy to see at a glance which offices and individuals were accessing the intranet and how often, says Paul DeNys, a senior consultant in KPMG's Knowledge Management Lab.

FINDING IT ONLINE

Aereal Inc.
www.aereal.com

Colt Virtual Reality Ltd.
www.coltvr.com

CompuServe Interactive UK
www.compuserve.co.uk

Construct Inc.
www.construct.net

Customized Internet Technologies Inc./MYski
www.myski.com

Duke Power Co.
www.dukepower.com

Dynamic Diagrams Inc.
www.dynamicdiagrams.com

IBM Corp.
www.ibm.com

Jon Peddie Associates
www.jpa-pcgr.com

Lockheed Martin Missiles & Space
www.lmsc.lockheed.com

Northern Telecom Ltd.
www.nortel.com

Prosolvia Clarus AB
www.prosolvia.se

Superscape Ltd.
www.superscape.com

Takshele Corp.
www.takshele.com

Teldor Wires and Cables Ltd.
www.teldor.com

The Virtual World Wide Web
vwww.com

VRMLSite
www.vrmlsite.com

One approach to simplifying user navigation is to build a 3-D representation of the site that can be rotated, the approach taken by Microsoft's WebMapper. The technique has the advantage of showing the entire site at once but can be confusing for large sites where the structure on the far side of the bush becomes too fine to visualize clearly.

Another more scalable idea is to move users through the site by generating a partial or "regional" map that situates the viewer somewhere between the top-down structure and a list of end nodes. That is the strategy taken by MAPA, a program offered by Dynamic Diagrams Inc.

The core MAPA view is a collection of rectangular cards standing up on a horizontal plane. Each card represents a Web page; the collection is a slice of the site about three levels thick. Markings on the card tell users whether the page represented by the card is a terminal node or if it leads elsewhere in the hierarchy. One click on a card pulls up a new collection of cards representing the structure of links controlled by that Web page (if any); two clicks pull up the Web page signified by the card. That partial view can be moved around within the site quickly and fluidly enough that it is easy to acquire a feel for the whole.

MAPA is not in three dimensions in the VRML sense—you can't fly through or around the cards—but the illusion of depth is strong. An illustrative demo organizing about 100,000 pages spread across almost 200 servers is running at IBM Corp.'s site (click on "map").

Being able to move a partial view around rapidly is especially useful for the management of large distributed sites in which files are being changed daily by local offices or project groups, says Alex Wright, a manager in IBM's Corporate Internet Program. Wright says MAPA lets him check continually across many servers for overlapping resources and topics, which means that even sites that change constantly can present a face that is organized by content rather than by the corporate table of organization.

Takshele Corp. has taken 3-D development one step further, using it as a structure for operating systems themselves. A user with thousands of files can spread them across four dimensions (including time) instead of clicking through level after level of a 2-D hierarchy of folders.

It is clear that 3-D development is going to be pushed hard in the next year, but some analysts, such as Michael Gough, creative director of the Internet design company Construct Inc., think the revolution might come slowly. "Most people can't think in 3-D," he says. "They think they can, but the 3-D they see around them—streets and walls and floors—is not real 3-D. Right now, a casual user dropped into a 3-D environment of any complexity or novelty would be lost the instant he or she moved."

Gough says that is why virtual worlds have such strikingly boring landscapes—any novelty would disorient users. He says that in the short term, penetration of the technology is going to depend on designers developing reliable orientation tools, like thumbnail views of 2-D maps running in separate frames.

He speculates that exposure to online 3-D tools might help people develop spatial imaginations powerful enough to allow them move around inside 3-D environments freely and fluidly, like birds, and that will allow them to dispense with the training wheels he thinks they need now. WM

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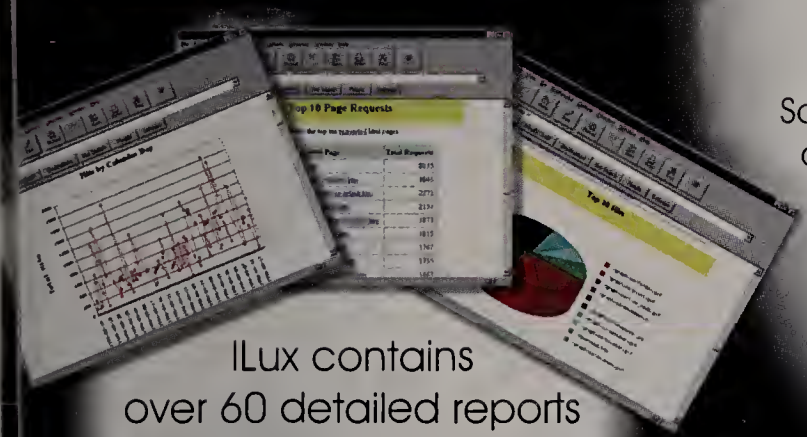

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THE Joys OF Togetherness

It's not soup yet, but the Web shows signs of becoming the most powerful collaborative environment out there

BY HEATH ROW

SOMETIMES IT IS BETTER TO GIVE AND TO RECEIVE—and to keep on doing both until you've achieved your goal. Although collaboration is all about such give and take, until recently most so-called collaborative Web efforts have involved little more than somebody posting information for somebody else to read and possibly reply to. But new tools and a full understanding of the Web's capabilities are transforming the Internet and intranets into places where people do real work together.

The Web is a particularly effective forum when the issues are sticky—like those that occupy the mind of Vahid Mansubi, manager of Unix networking for Hewlett-Packard Co.'s Worldwide Technology Expert Center (WTEC). Mansubi oversees 17 high-level engineers who tackle the company's Unix networking problems. When end users and customers call HP's help desk, the response center's 3,500 support engineers usually can handle their requests. But if a fire is big enough, new enough or complicated enough, the call will make its way up three more levels to the WTEC. "The most critical and real problems get to us," Mansubi says.

At that level, answers aren't something you find in a manual: They're complex, multifaceted and can be difficult to implement. Passing down those solutions to lower levels of support staff so that they can be ready with a hose if the same fire flares anew involves detailed explanations and plenty of give and take.

At HP, that type of collaboration sometimes means a two-hour problem-solving and training session. A few years ago, extremely serious problems might require support staff to rework their schedules and possibly log some air time.

In 1993, HP began exploring ways to avoid that expensive and time-consuming process. By cobbling together an array of TCP/IP-based desktop videoconferencing and data- and application-sharing software, the company enabled its employees in North America, Europe and Asia to gather online occasionally to discuss situations and pass on fixes to lower levels of support staff. But that solution had its own drawbacks. "There are a lot of different products that

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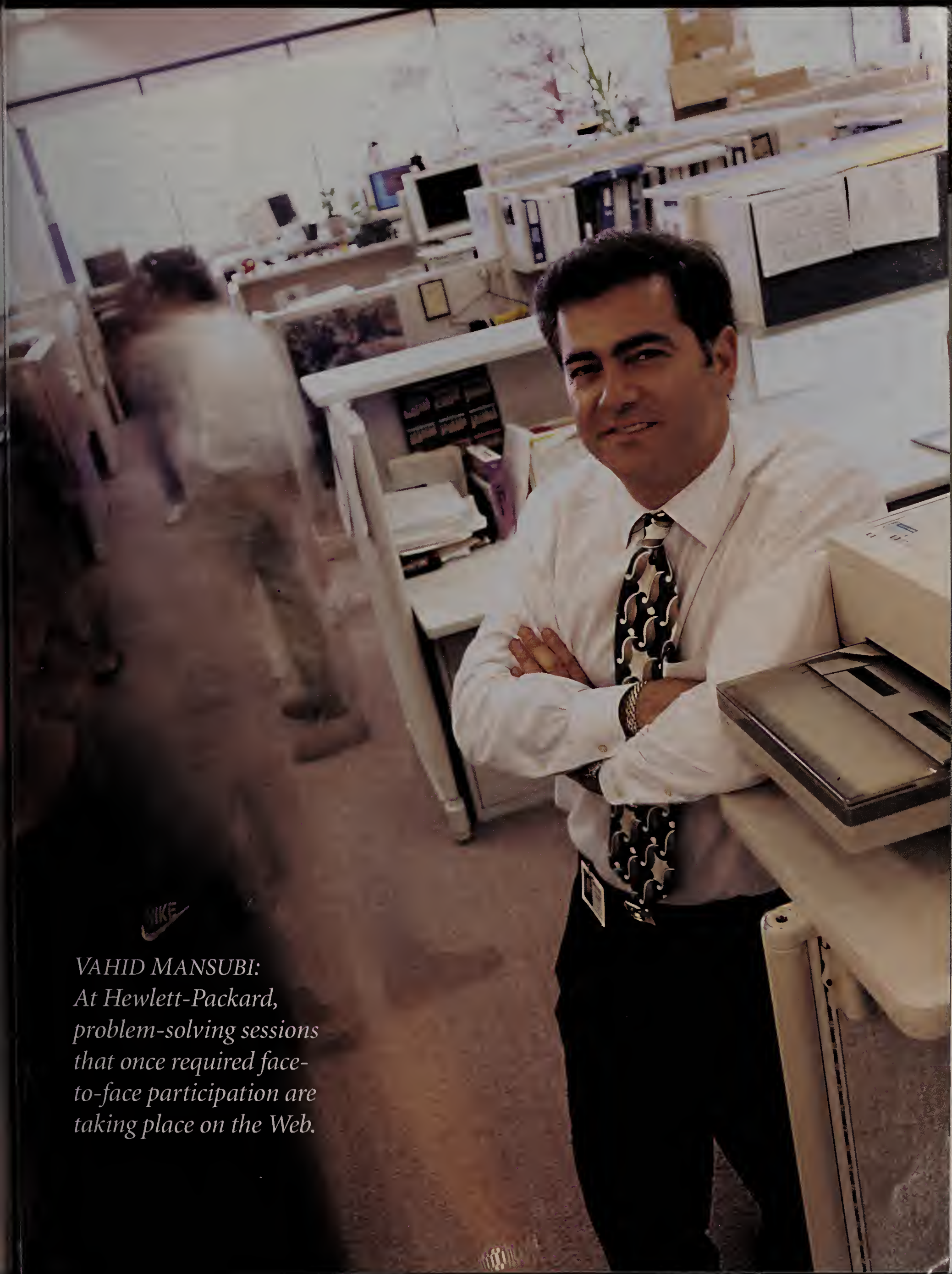

VAHID MANSUBI:
At Hewlett-Packard, problem-solving sessions that once required face-to-face participation are taking place on the Web.

we're using, and they're not well integrated," says Garry Orsolini, project manager for the HP Desktop Classroom workgroup. "They don't span PC and Unix, and they're certainly not low bandwidth."

ROBIN PALMER: "You can do everything people wanted to do with videoconferencing on your computer."

So last year, Orsolini's group developed a Java application that creates Web spaces in which distributed workgroups and teams could do their thing, no matter what their individual platforms. Then HP came across Auditorium, a Web-based multimedia product from PlaceWare Inc., which spun off from Xerox Palo Alto Research Center (PARC) in November 1996. By adding its home-grown application to Java-based Auditorium, HP can organize problem-solving sessions on its intranet and deliver fixes to engineers at their desktops in easy-to-absorb doses during collaborative, real-time training sessions (see "Meeting Room of the Minds," Page 48).The company is now conducting an alpha test of the Desktop Classroom, and an enterprisewide rollout is in the works.

WHILE client/server groupware and other networked collaboration tools have been available for some time, the technologies needed to support spaces on the Web in which complex work can be done easily are only now emerging. Most companies currently developing large-scale workspaces on the Web are in technology industries, and they use such areas primarily for online discussion, videoconferencing, and data- and audio-sharing, says Mellanie Hills, former leader of J.C. Penney Co. Inc.'s Internet, intranet and extranet teams and author of *Intranet as Groupware* (John Wiley & Sons Inc., 1997). As computer-aided design tools move to the Net, however, more companies will develop collaborative authoring and concurrent engineering projects, which could become the highest-end Web-based workspaces. "Concurrent development is a big competitive advantage," says Hills, who is also the founder of Knowledgies, a consulting company that specializes in collaboration. "Most companies don't talk about it."

At KPMG Consulting, Web-based collaboration has already progressed beyond simple information sharing, says Robin Palmer, national partner in charge of the consultancy's electronic commerce practice. As the company develops methodologies for its "Electronic Commerce Guide," a set of reference materials for the staff, it is experimenting with collaborative authoring on its intranet. Eight KPMG employees scattered around Australia, the Netherlands, the United Kingdom and the United States wrote, edited and commented on the guide using WebFlow Corp.'s SamePage, a tool that allows users, in real-time, to break text files into objects and discuss content within the content itself. For example, several executives could draft different sections of a memo while editing other sections and participating in a Web-based discussion about the memo—all at the same time.

"The primary benefit of Web-based collaboration is the Web's environment, which allows you to do multiple activities in a seamless fashion," says Palmer. "You can share documents. You can give presentations. You can do everything people wanted to do with videoconferencing on your computer. There's no other medium that brings things together like that."

And that includes face-to-face meetings. Although most experts are quick to point out that online collaboration doesn't replace in-person interaction, there are times when it's much more productive. One reason is that in face-to-face meetings, participants don't always have access to their companies' IT infrastructures, says Pavel Curtis, one of PlaceWare's founders and principal architects and a longtime member of Xerox PARC's research community. That means if they need information from databases or legacy systems, participants must bring photocopies or printouts, or everyone has to crowd around a single PC. If the group gathers on the Web, however, participants can access the information and resources they need while the meeting is underway. "People have been looking for value in Web-based collaboration," says Curtis. "They don't understand why they'd want to invest in all of this collaboration stuff if all it is, is conversation. Collaboration is not just conversation. It's joint activity around certain artifacts."

AT SUN Microsystems Inc., those artifacts are software objects, but they could just as well be sales proposals, reports, blueprints or bills, says Mark Bauhaus, director of the Java and Internet practice at Sun Professional Services. "Even when collaborating on a sales proposal for a contract, it doesn't have to be by

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Knowledgies
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The Palace Inc.
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PlaceWare Inc.
www.placeware.com/

Sun Microsystems Inc.
www.sun.com/

WebFlow Corp.
www.webflow.com/

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fax or telephone," he says. "It can all be done on the Net."

Currently, two teams in the Information Resources division of Sun's largest business unit, Sun Microsystems Computer Co., are leveraging the Web's collaborative powers. The first team, which developed Sales Desk and is now working on the pilot of a sales-force automation tool draws on 30 people and other resources residing in the United States, the United Kingdom and India. The group maintains documentation, stores reusable software objects in a library, and holds meetings on an intranet, says Tanya Dins, director of sales, marketing, engineering and shop floor systems for the division. "In the past, all development was done in California because everyone was together and it was easy to communicate," Dins says. "Now I'm taking advantage of a lot of expertise in India. At the same time, a large portion of my enterprise is in the U.K."

Sun also uses an extranet to collaborate with outside vendors' engineering groups. If it weren't for the Web, Bauhaus says, such projects would take longer, be more difficult and cost more. In addition, Sun probably wouldn't be able to include people on three or four continents in the same workgroup. For example, if a team in the United States were collaborating with a team in Japan, the lag time between file transfers and revisions could kill a project.

Dins also manages a team working on a manufacturing system project that couples Web-based discussions and development libraries with rudimentary workflow rules. By tracking progress on the Web, she can automate project updates and deadline reminders. When a deadline nears or people need to submit approvals and status reports, team members receive an e-mail that contains an embedded link to a portion of the project's Web site. Users can access the intranet pages directly, too, and communicate in real-time with others. "When you have to work with different time zones, it's much easier for people to access something on the Web and then answer someone's question," says Dins.

DOESN'T traditional groupware do that already? Yes, but not well enough. While traditional client/server groupware offers many of the capabilities as Web collaboration tools—including real-time conferencing—the Web-based tools are easier to master. "With groupware, the learning curve is

PHOTO BY ROGER MASTROIANNI

ALAN EVANS: Collaboration doesn't just happen

Student Union

What one professor learned about online interaction

ALAN EVANS'S experience with online student-teacher collaboration at Kent State University has taught him some lessons that also apply to companies trying to improve their own Web-based meetings and work sessions. By keeping these tips in mind, businesses can jump to the head of the class.

First of all, says Evans, director of the Instructional Resources Center in the university's College of Education, people communicate differently online from the way they do in person. Introverts, for example, may be more likely to speak up in Web-based discussions, while others say less, sometimes actually drafting their ideas at their desks or workstations before typing them into the workspace. "Some students are more open online than they would be in a classroom," Evans says. "And people's communication also tends to be more succinct."

In addition, Evans has learned that while the Web is lauded for its ability to reach large numbers of people, collaboration still works best among small groups. "The nature of the dialogue varies with the increasing number of people," he says. "To have too many people in a [virtual] room is totally dysfunctional. Three to five is probably the most effective, unless there's a moderator present."

It's also important to make project-related resources available to people in the workspaces. At Kent State, faculty members who develop The Palace environments create rooms using a digital camera and incorporate props such as caricatures and photographs in online role-playing exercises. In addition, instructors maintain records of what went on during a session so that participants have something to refer to later.

Lastly, environments such as The Palace don't require a lot of bandwidth or hardware. Evans and his colleagues have discussed linking university servers with organizations such as the Ohio Literacy Resource Center in order to distribute Kent State's Palace architecture. Different divisions of a company can take advantage of the same collaboration technologies without investing in them individually. *–H. Row*

Meeting Room of The Minds

Hewlett-Packard engineers learn the tough stuff in a virtual classroom

PARTICIPANTS in Hewlett-Packard Co.'s HP Desktop Classroom can do everything they would in a normal classroom except throw erasers. Collaboration among group members generally centers on a distributed Powerpoint presentation about the task at hand. High-level engineers training lower-level support staff can schedule short sessions, run through a set of slides describing problems and possible responses, annotate the slides using a whiteboard tool, answer questions from participants in a chat window, and break the group into smaller teams for targeted discussion and development—all in real-time. The Desktop Classroom workgroup met online while developing the application, and now Project Manager Garry Orsolini manages it over the Web.

The Desktop Classroom is intended for large-scale, top-down information sharing. Eventually, large groups will gather in the commodious "auditorium" created by PlaceWare Inc.'s Java-based tool of that name. But right now, HP employees work together in smaller groups, using the spaces such as "rows," "classrooms" and "situation rooms" in the Desktop Classroom application that the workgroup built on Auditorium's platform.

"You can broadcast from one to many on the Web, but immediately people want to form communities," Orsolini says. "The interactive nature makes it a lot easier to facilitate questions and get a dialogue going. It's an online, real-time meeting of the minds." *–H. Row*

so severe that you have to send everybody out or bring someone in for training," says Hills. "With the Web, it's easy. You teach them how to click; you teach them how to search." In addition, the Web allows you to tie in work-related resources such as files, databases, and other content.

Web collaboration also encourages more creativity and synergy because users know that other people are present, says Hills. Even if the communication is asynchronous, people still have a greater sense that co-workers are there—or have been there—because message-based discussions are easier to follow than the file-based discussions that occur in many client/server groupware applications. "There is a greater sense that you're cooperating with others because it's easier to follow a thread of discussion and see the interactions," says Hills. "Putting yourself into the conversation is easier."

And because Web-based collaboration tools are easier to use, people may use them more frequently than other collaborative tools, thereby increasing the sense of community, says Wanda Orlikowski, an associate professor of IT at MIT's Sloan School of Management who is researching how information technology relates to organizational structure, culture and work processes. In addition, "the multimedia nature of the Web may help construct an image and identity for the shared activity, which may have been more difficult in the plain text of many traditional collaborative tools," she says.

THAT HAS been the experience at Kent State University, which is using the Web and related technologies to bring students, professors and educational resources together in fully rendered virtual reality workspaces. For example, Alan Evans, director of the Instructional Resources Center in the university's College of Education, researches and teaches educational applications of the Internet—including videoconferencing and discussion groups—in The Palace, an Internet-based multimedia chat environment where users navigate avatars through an interactive two-dimensional space. Evans and several other faculty members in the education department use The Palace to hold discussion groups for about 75 students, and Evans plans to use it for office hours beginning this fall. In addition, a support group of six graduate students meets once a week in The Palace while researchers analyze their interactions in order to learn about the site's potential for group counseling. As the university's intranet development continues, there is discussion about replicating parts of The Palace on a universitywide internal Web site as well as setting up mailing list-based discussions.

Also under consideration is a plan for instructors to use The Palace, which Kent State houses on a Silicon Graphics Inc. server running SGI's IRIX operating system, to develop lesson plans and set up virtual lab experiments where students will work together to assemble objects online. While The Palace was designed as an environment for chat, Evans says that it and similar tools have a variety of uses. He suggests, for example, that with The Palace and other technologies, the university might create virtual classes for students in northeast Ohio who might not be able to attend in person.

In education, as in industry, Web-based collaborative applications will become more useful as the technologies mature, says Sun's Bauhaus. Tools being developed today are aimed at supporting discussions and communal decision making as well as collaborative design and development—particularly over an extranet. Count on it: In the years ahead, you will hear less about machines working together and more about people working together. WM

Heath Row can be reached via e-mail at hrow@cio.com.

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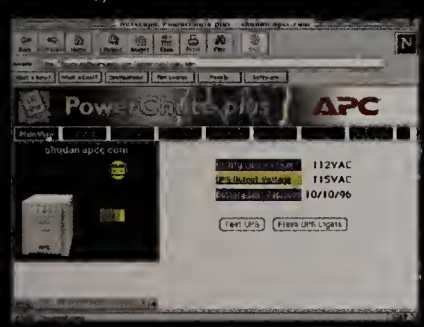

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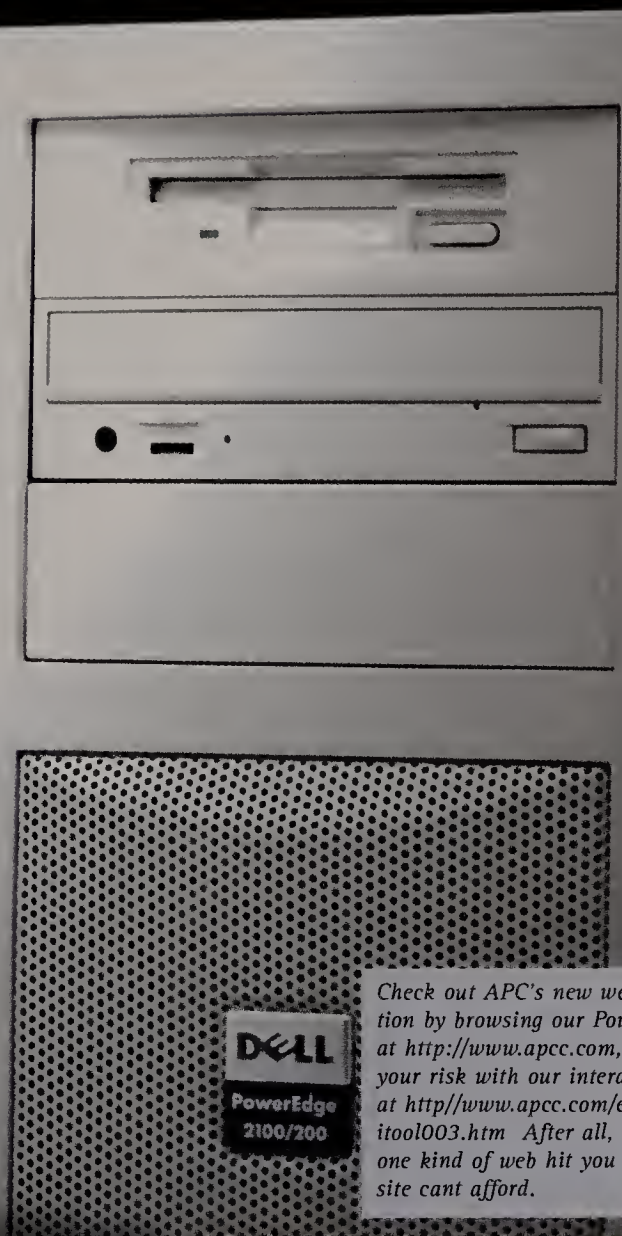

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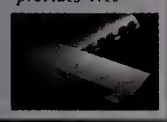

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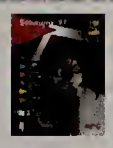

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Web War

Not really. But when webmasters and CIOs can't resolve their differences, the chaos rivals that of a bad B-movie.

BY CAROL HILDEBRAND

if you believe everything you hear about webmasters and CIOs, you might think the relationship is a clash of diehard rivals, a Godzilla versus King Kong blowout in conference room B. Popular lore about the animosity between the roles is familiar enough that a spoof of the dispute by executives from Dell Computer Corp. at a *WebMaster* magazine-sponsored conference in August 1996 drew knowing chuckles from the crowd.

As part of the role-playing shtick, Kenneth Hill, online business development manager of Dell Online, donned a hippie wig, and Andy Greenawalt, the company's vice president of information services for the Americas, wore a policeman's cap. "We drew the positions as extremes, but the nugget of truth is still there," says Hill. "We've actually had all these battles."

Is it really that contentious? Say it ain't so. Well, the stereotype is based on some element of reality, says Harry Max, Web consultant and founding webmaster at Virtual Vineyards, a direct marketer of specialty wines and gourmet food in Palo Alto, Calif.

IT executives and webmasters are likely to butt heads on a number of different issues, he says. The webmaster's job is to experiment with unproven technology to develop and build internal and external Web sites. The faster a webmaster builds a site, the faster a company can use it to grab new business opportunities. Anyone who slows down the pace is wrongheaded and obstinate. Immersed as they are in this burgeoning technical area, Web builders can also view the Web myopically as the ultimate computing solution.

To the CIO, however, the Web is just one technical piece to consider and support along with other core technologies, methodologies, business applications, security—"all the stuff that IT is responsible for," says Max. In many organizations, he says, "the CIO is the anchor of the IT institution and the webmaster is a solo space explorer, off looking at way-out-in-front technology."

But is that the case at all organizations? Of course not. At many companies, CIOs are ardent proponents of the Web. Likewise, many webmasters see beyond their own digital fiefdoms to recognize the very real barriers to practical Web business application. Hill and Greenawalt stress that the important thing to learn from the stereotype is how to get beyond knee-jerk conflicts and get down to solving problems. Following are excerpts from their presentation and selections from follow-up interviews on how they got past the entrenched us-versus-them argument and identified and fixed underlying problems.

www.web-master.com/

THE CIO

Andy Greenawalt, **Dell's vice president of information services for the Americas, has spent almost all of his 20- year career working in various information technology functions, including application development, data center management and network management. He describes his career path as "pretty typical of a CIO."**

versus

THE WEBMASTER

Kenneth Hill, **online business development manager of Dell Online, started working at Dell approximately 12 years ago. He began in the manufacturing division, where he engineered, designed and developed manufacturing software and custom databases. He moved into sales nine years ago. He started using online tools for customer service and started getting into the Internet and intranet.**

The History. **Hill's team was working on a sales- force automation project about three years ago when it first saw the possibilities of the Web. As his group explored the project, they discovered that Greenawalt's IS folks controlled access to most of the databases of information that Hill and company coveted as content. That's when things got a little tense, and Hill and Greenawalt cheerfully admit that the road to success was paved with more than a few arguments. But the two groups were able to resolve their different views and compromise on a program that built a thriving Web presence: The external site now gets 31,000 unique visitors daily, millions in sales monthly and millions in operational savings annually. The intranet has 9,000 users, 150 different content areas and 40,000 pages of content, and it is still growing.**

PHOTOGRAPHY BY WILL VAN OVERBEEK • ILLUSTRATION BY DAVID SMALL

CONFLICT 1

Opportunity versus Risk

THE WEBMASTER Kenneth Hill: **"The Web represents unlimited opportunity. We could really increase our revenue by jumping on this technology aggressively. There's also a cost savings if we can use the Web for customer service and to open up a new selling channel. Customers should love it—it's very easy to use. And everybody is talking about the Web and what smart companies are doing with it. If we can get our brand out there and build up a 'happening and progressive' reputation with our customers, we'll enhance our corporate image. Sure, there are some risks, but if you don't take risks, you lose your competitive edge. But we can't sit around—we need to act immediately."**

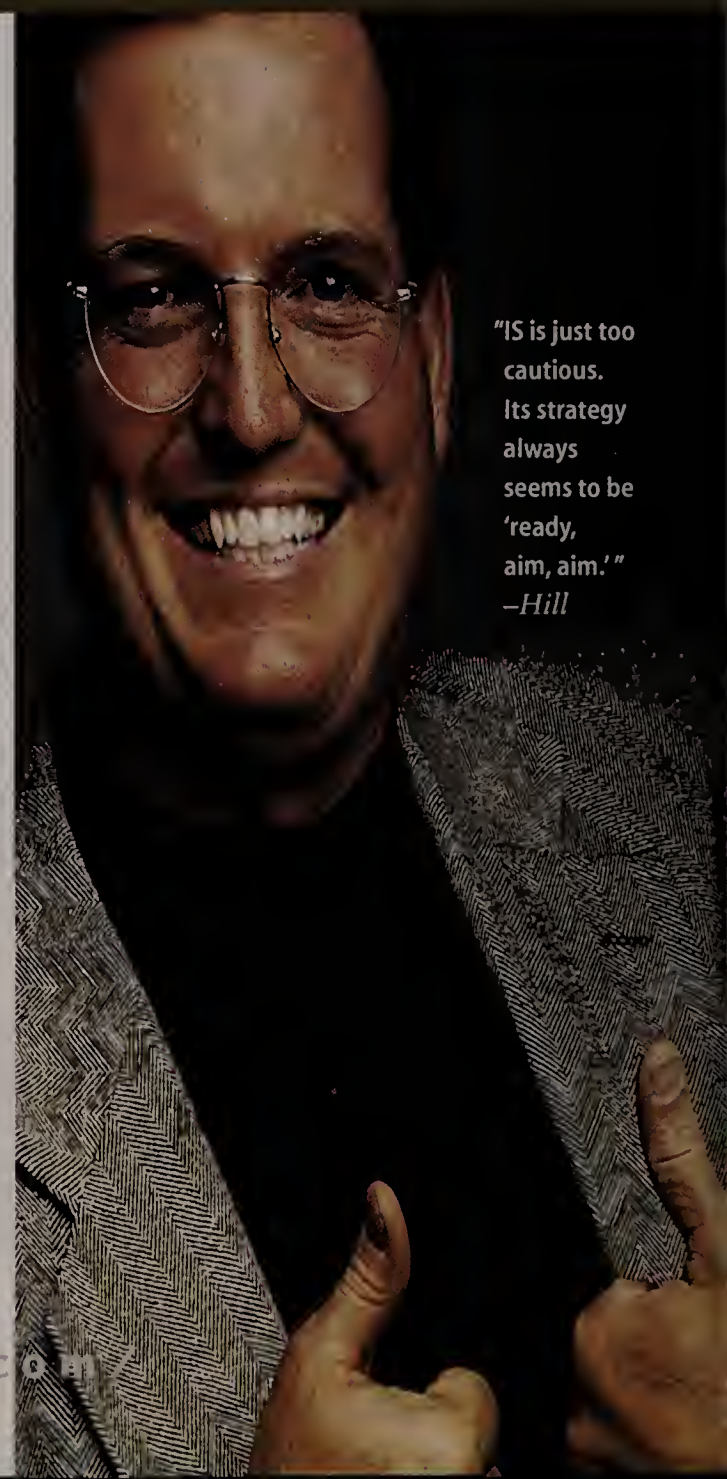
THE CIO Andy Greenawalt: **"Well, IS knows one thing about new technology that webmasters ignore—it's unproven, and that means risky. The Web represents an enormous opportunity to make money and enhance corporate image, but it's also a risk. Have you thought about the risk of dealing with all that new money rolling in via unsecured transfer? Just what we need. And the first customer who gets burned doing business on the Web will be sure to blame us—not themselves, not the technology, but us. So much for shining up the corporate image. As for saving money, that's what you say. Where are the numbers? We don't even know how much this is going to cost, so how can we possibly predict how much it's going to save?"**

SOLUTION 1

Joint Risk Evaluation

In order to separate good opportunities from bad risks, Greenawalt and Hill needed to refocus their discussion on internal and external customer needs. If a Web/IS team concentrates on a joint concern with customer desires, each faction becomes less concerned with defending its position and more concerned with working out a solution. In Dell's case, Hill and Greenawalt put together a Web team of people from IS and from Hill's group, Dell Online. The group polled internal customers (for the intranet) and external clients (for the Internet site) on what they'd like to access online. For example, would prospective intranet users get excited about Web-enabled sales-force automation tools? Would external customers like better technical support on the Web? The idea was to identify customer needs and desires, says Hill.

Then the group matched the customer wish list with Dell's products and services to see whether a particular Web project would prove valuable to disparate business functions. Next, "we went off to talk to business units to see how these things fit in with the business model and strategy," says Hill. The group then found business executives willing to act as departmental sponsors (that wasn't very difficult: CEO and company founder Michael Dell is an enthusiastic Web sponsor), analyzed the information they'd gathered and came up with a strategy for the Web. The point, says Hill, is that "the Web wasn't about what the marketing department wanted or what the IS department wanted or what I wanted. It was about what we could do."



"IS is just too cautious. Its strategy always seems to be 'ready, aim, aim.'" *–Hill*

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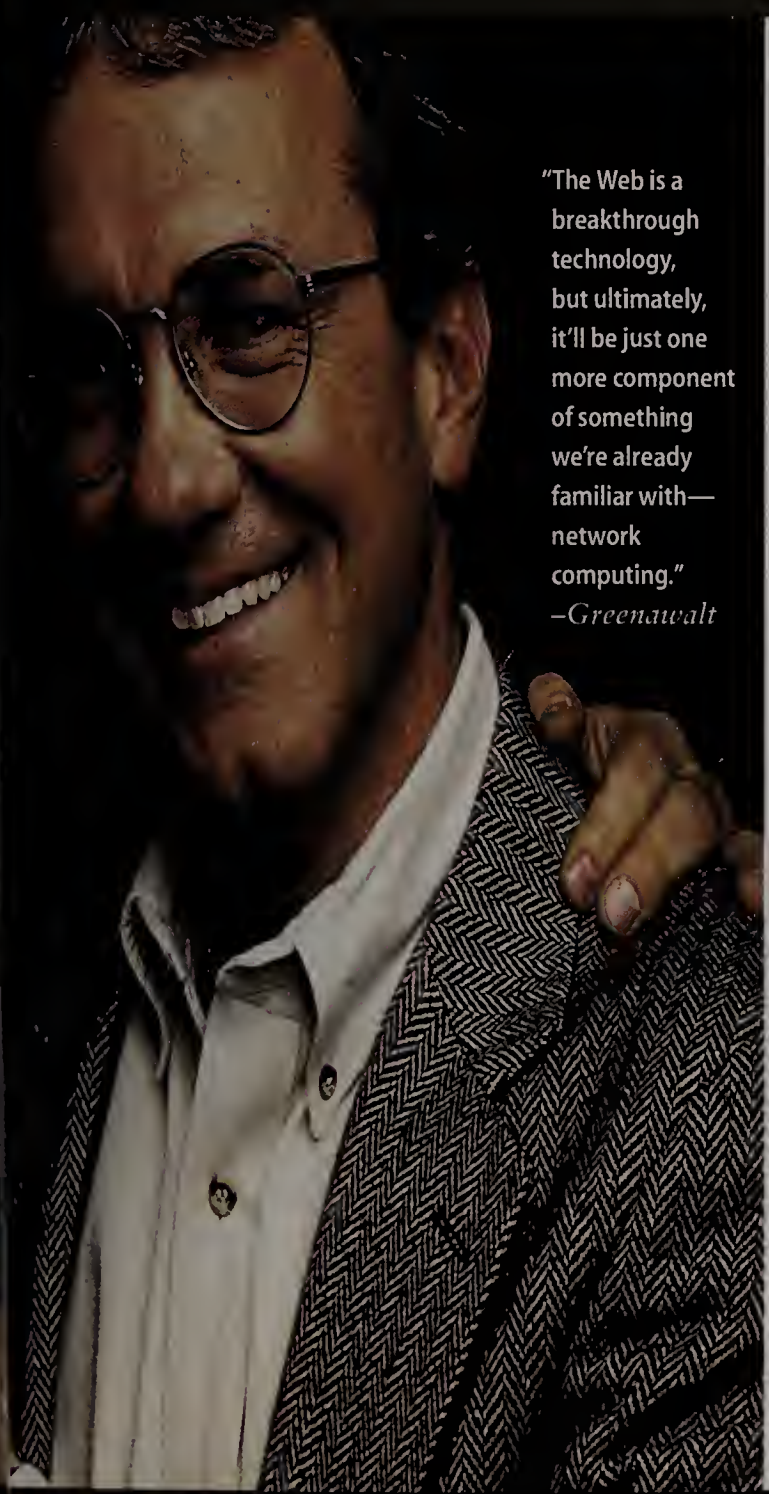
CONFLICT 2

Customer Needs versus Company Needs

THE WEBMASTER Kenneth Hill: "I'm actually curious to know how you'd even recognize a customer of this company. We've spent our whole careers in line business units; it's our job to talk to the customer, and we work hard to give them what they want. IT folks, meanwhile, are busy arguing about the latest programming language. Besides, our clients want perfect service, and I don't think you can deliver that. If we put up a new customer support system, it can't have technical glitches. How can IT promise that when you can't even keep my desktop PC up and running? I can't risk putting IT in contact with my customers. You'll screw up the relationship we have with them."

THE CIO Andy Greenawalt: "Just because we don't spend time with what you call 'paying customers' doesn't mean we're ignorant about customer service. We support thousands of internal customers every day—people like you, who are every bit as demanding as outside clients. IS has always been a service organization here, and we take our responsibility to our users seriously. Our management controls and valuable technical knowledge will keep you from making unnecessary beginner's mistakes. As for our technical abilities, keeping your PC running is one very small part of our job. We keep the infrastructure going, and that's where the Internet action will be. It isn't about desktops. It's about servers, and we've been running servers in the data center for decades."



"The Web is a breakthrough technology, but ultimately, it'll be just one more component of something we're already familiar with—network computing."
–Greenawalt

SOLUTION 2

Go to the Source

Hill and Greenawalt learned that a Web team can best represent customer needs by involving customers in the site implementation. In Dell's case, the original Web team expanded into a cross-functional implementation team with representatives from business segments, Dell Online, IS, a smaller IS group responsible for Dell's SAP project, marketing, public relations, product groups, the legal department and international divisions. The team made sure that external customers were represented as well. Hill began surveying a focus group of about 100 customers quarterly about Internet issues, and the Dell Online team continues to seek customer feedback informally, Greenawalt says. The idea, say Greenawalt and Hill, is to apply the experience of each function where it is needed in the Web development cycle. Because each group's expertise is recognized as valuable, team members are less apt to downplay others' contributions.

The team hammered out a set of roles and responsibilities for each aspect of the implementation plan. Everybody shared in planning and budgeting. The business segments were responsible for prioritization and content. Dell Online took care of publishing duties such as development and support, Web operations and Web training. IS took the lion's share of infrastructure duties such as network, server and desktop management, although Dell Online also lent a hand. The important thing, says Greenawalt, is to keep momentum going "with a continual discussion about what we want to do, what we want to fund and what can wait."

CONFLICT 3

versus

THE WEBMASTER Kenneth Hill: **"IS is just too cautious. Its strategy always seems to be 'ready, aim, aim.' Well, we don't have time to write a strategy and a plan! If we wait, the competition will get there before us, the technology will evolve and we'll fall hopelessly behind. Instead of piddling around on some lukewarm pilot program, we should do a 'saturation bombing' of the company. We'll throw a bunch of projects out to the user community and see what they think. We'll be able to quickly gauge users' reactions. We need rapid deployment; we can test and refine things on the fly, and user feedback can help pinpoint fixes and opportunities. Once they try the Web, users are bound to get hooked and want more."**

THE CIO Andy Greenawalt: **"Have you ever watched a technology project fall apart publicly? It's not a pretty sight, and it's not good for your career. The folks in finance get very upset when you waste capital. Your implementation idea looks like the 'ready, fire, aim' model. We need to be prudent here. We should use a system development cycle. You identify and prioritize opportunities, establish a strategy, design and develop the application, test it and carefully deploy it using small pilot programs. If we put together a good, methodical plan based on proven techniques and we're very fortunate, we'll get some good results and satisfied customers."**

SOLUTION 3

Build a Procedural Infrastructure

Hill and Greenawalt realized that they had to know which projects warranted the most attention before they could decide on an implementation schedule. The team decided to build a framework based on customer needs and Dell's capacity to implement each application. Building on the information they'd already gathered, the team figured out which Web initiatives customers wanted most and what implementation pace was comfortable for them.

The idea was to make sure Web features were created based on customer interest rather than on ease of development. "Sometimes we could develop something really fast, but the customer wasn't yet ready to take it," says Hill. The group compared its progress with that of the competition, tested available technology, got executive support, approved budgets and schedules, and came up with policies and procedures to govern the whole process. "Then we buckled our seat belts and took off," says Hill. "We're really moving rapidly, but without the policies and procedures, I doubt we'd be as in control of the ship as we are today."

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CONFLICT 4

versus

THE WEBMASTER Kenneth Hill: **"A big part of the problem is that you're scared of the Web. You know it's going to dominate everything you do, and you're fighting to protect your turf. Well, it won't work. Didn't you learn anything from the client/server revolution? The Web will make that look like a barnyard scuffle by comparison. This technology is cheaper than any of the systems you're working on; look at the price difference between custom-designed EDI projects and Web-based electronic commerce, for example. The Web is electronic commerce—everything else will become obsolete. The Web is the ultimate end game in client/server, and it's going to make your job obsolete."**

THE CIO Andy Greenawalt: **"The Web is a breakthrough technology, but ultimately it'll be just one more component of something we're already familiar with—network computing. It has immense value in niches but it won't take over the world. You mentioned electronic commerce, for example. You're right; the Web has a big role to play there, but it's not going to replace all the other things we're using for [electronic commerce]. EDI, for example, has far better security than the Web right now. Running the IT infrastructure involves things you've never given a second thought to, from network management to security administration. Web technology is just one more item to add to the IT portfolio."**

SOLUTION 4

Fitting the Web Into the Puzzle

The Web team's previous work helped it look at the Web as part of the big picture, say Hill and Greenawalt, so this issue was not as divisive as it could have been. Another helpful factor was that the team was not laboring in isolation. By involving employees from all parts of the company, the team reduced the chances of building Web applications that didn't work with existing systems.

The Web team realized that the Web was not going to take over Dell's systems plans—its SAP implementation is going forward, for example. But by figuring out where the Web has the most strategic impact—marketing, services and sales—the team could deploy the technology most effectively. Fitting the Web into the existing infrastructure also involved a lot of selling on Hill's part, to help teach internal and external customers to turn instinctively toward the Web. "It has to be part of the whole mainstream business thinking process," says Greenawalt, "but knowledge and appreciation of what the Web can do was very uneven. Some groups were way up the curve on Web stuff and some weren't. Kenny and the team did a great job of advertising successes and moderating expectations."

Finally, the group is still working on linking legacy systems to the Web, and it will be for some time. "It's tough," says Greenawalt. "We don't want to pull information off the mainframe if we don't have to, because we don't want to end up with multiple data structures all over the place. It's a cause-and-effect we don't like." WM

Senior Editor Carol Hildebrand can be reached via e-mail at cjh@cio.com.

A *WEBMASTER* EDITOR REPORTS BACK FROM A CONFERENCE ON ETHICS IN ONLINE JOURNALISM AT THE POYNTER INSTITUTE FOR MEDIA STUDIES BY ANNE STUART

The New Right

We arrived with questions. We left with more questions.

Like the Internet itself, the conference on new-media ethics was intensive, informative, democratic, interactive. Thirty-eight participants—Web content managers, traditional journalists and educators—debated passionately, often heatedly, about the future of old-media values in a new-media world.

Over three days, we drafted guidelines designed to help media outlets write codes for ensuring content reliability, making responsible linking decisions, using database information fairly and balancing journalistic integrity and revenue demands. (The guidelines can be found at *www.poynter.org/me/nme/me_samprot.htm.*) But, reflecting the complexity of the ethical issues facing the publishing industry in general, we failed to reach consensus on many issues and, in some cases, to even agree on the nature of the problems.

Some participants contended that there aren't any problems—at least, there aren't any new ones. Journalism is journalism, they argued, whether it's in print, on the air or online. Traditional media values—accuracy, authenticity, balance, fairness, thoroughness, accessibility, news judgment—still apply.

That's a good start, said others, but it's not enough. Electronic publications, already diverging from their paper-based predecessors in content and design, have created a new generation of ethical questions, too.

Besides, the new-media camp argued, cyberspace is like nowhere else. Its evolving culture attracts new audiences with different values, different expectations, different rules of engagement. "Online media can take us and our readers to places journalism hasn't been before," conference facilitator Joann Byrd, editorial page editor of the *Seattle Post-Intelligencer*, wrote in the November 1996 issue of *The American Editor*. "And in those places, our values may be obstacles or antiques."

To cynical readers, "media ethics" and "media values" may sound like oxymorons. But mainstream journalism has long relied on a set of basic assumptions about what's fair play in finding, getting and telling stories. In recent years, professional associations have shaped those once-unwritten commandments into principles covering everything from conflicts of interest to computer-enhanced photographs.

Despite the uncertainty, most reputable journalists and organizations develop instincts about what's right and what's wrong, or at least what's questionable. That is, until they start publishing online. Then many of those issues—never crystalline—suddenly seem as murky as week-old espresso.

If the participants in the Poynter conference did not unearth any absolute answers, our debate

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did develop some potential guidelines for dealing with big-picture questions likely to provoke thought, debate and headaches for some time to come. Some examples:

How should advertising and editorial content relate to each other? The old-media take on this is simple: They shouldn't. Advertising shouldn't influence editorial. Editorial shouldn't aim to lure or please advertisers. Neither should confuse readers about which is which.

But on many Web sites, that church-and-state separation melts into something squishier. One real-life example: An online publication runs editorial copy on recommended weekend activities, including three links. Two of those links take the reader to additional editorial content. But the third—not differentiated in any way—is a link to a paid ad for a restaurant. Readers would rarely, if ever, see such a direct reference in print. Does it confuse them or betray their trust to make the connection online? Would it be acceptable to link to a restaurant from a review?

On other sites, corporate sponsorships—a car dealer sponsoring online automobile reviews, for instance—further blur the lines. So do Web-based partnerships with local businesses.

And then there's design: It's often tough to distinguish between a jazzy editorial layout and a splashy ad, particularly because few Web publications bother to label potentially confusing commercial materials with an "advertisement" tag.

Complicating things further is the fact that in this cash-starved medium, many editors handle content *and* revenue. That's unheard of in traditional media outlets, in which journalists can't always remember the way to the sales department, let alone quote rates. But if those same journalists become Web managers, that blissful ignorance can disappear overnight.

Suddenly, "you are a businessman, a businesswoman, not just an editor," said Fred Mann, a veteran reporter and editor who added marketing, promotions and ad sales to his duties two years ago when he became general manager of Philadelphia Online (*www.phillynews.com*), a service of Philadelphia Newspapers Inc. "You are expected not just to gather and report and edit the news like in the safe old days. You are expected to do all that and turn a profit...soon." Despite changing technologies, business models and roles, online publishers that want to retain credibility must redouble their efforts to make sure audiences clearly distinguish between paid and independent content.

In this cash-starved medium, many editors handle content and revenue.

To link or not to link? Unlike decisions about advertising, decisions about linking have no old-media standard. Should editors check out every external site they link to? (Some publishers, including The Washington Post Co., do.) Do they share the blame if their links steer readers to inaccurate, offensive or potentially harmful information? Should they link to controversial sites in the news?

For example, when one Web-based publication wrote about racist humor on the Internet, editors opted not to link to online examples, arguing that they would never publish or broadcast such material. But some conference participants disagreed with that decision, contending that by withholding the link, the editors were denying readers the right to judge the material themselves.

What does it mean when the deadline is always right now? Online publications aren't limited to the daily, weekly or monthly deadlines of their print and broadcast brethren. They can publish at any time. On one hand, that means endless opportunity to break and continuously update the story. On the other, it can mean being first with information that's incomplete, unbalanced or flat-out wrong.

Obviously, online editors need to build in safeguards to balance the competitive demands for ever-increasing speed and the ethical obligations for reliability and fairness.

What do online readers want? And should publications give it to them? In an era when readers can customize their news, online journalists must consider not just how to serve the public interest but also whether they can do it at all. "Is it our role to challenge people to think?" asked John Creighton, vice president of The Harwood Group, a public-affairs research firm. "Or just to fill consumer needs?"

And as publishers increasingly add chat forums, discussion groups and other interactive features to their sites, they face sticky questions about how to police the online communities that may form. What happens, for example, when readers post vulgar, inflammatory or otherwise offensive messages? Most organizations wouldn't print or broadcast such comments, but deleting them from a forum makes journalists feel like censors, and limiting debate violates the spirit of the Net. Again, publishers set standards both for presentation and participation.

About the only statement generating no debate was this one: As the Web expands, so will the number of ethical questions facing those who populate it with content. Because publishers can't plan for every scenario, they must develop blueprints to guide their ethical decision making, keeping their missions and their constituents firmly in mind. Like building a Web site, it's a job that will never be finished. WM

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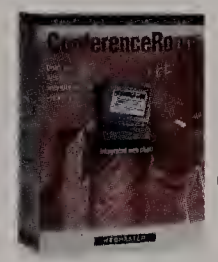

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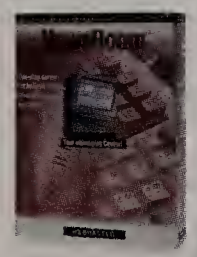

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Page numbers refer to the first page of the article(s) in which the company is mentioned. This index is provided as a service to readers. The publisher does not assume any liability for errors or omissions.

Company Index

Aereal Inc. 36
Allaire Corp. 8
Amulet Inc. 64
Autodesk Inc. 36
Bell Communications Research Inc. 8
Business Cards Tomorrow Inc. 14
Cisco Systems Inc. 8
Citibank NA 14
Colt Virtual Reality Ltd. 36
CommerceNet Consortium 8
CompuServe Interactive UK 36
Computer Professionals for Social Responsibility 8
Construct Inc. 36
Customized Internet Technologies Inc. 36
CyberCash Inc. 14
Dell Computer Corp. 50
Deluxe Corp. 14
DSP Development Corp. 22
Duke Power Co. 36
Dynamic Diagrams Inc. 36
Electronic Frontier Foundation 8
Ford Motor Co. 6, 26
Fruit of the Loom Inc. 6, 64
Heineken USA Inc. 6
Hewlett-Packard Co. 26, 44
IBM Corp. 16, 36
Internet Content Coalition 8
Internet Shopping Network 36
Internet Society 8
iPrint Inc. 14
J.C. Penney Co. Inc. 44
Jon Peddie Associates 36
Kent State University 6, 44
Knowledgies 44
KPMG Consulting 44
KPMG Peat Marwick LLP 36
Lockheed Martin Missiles & Space 36
Logility Inc. 64
Microsoft Corp. 8, 26, 36
MYski Inc. 36
Netscape Communications Corp. 14, 26
Northern Telecom Ltd. 8, 36
Oracle Corp. 14
Palace Inc., The 44
PFN Inc. 64
PlaceWare Inc. 44
PointCast Inc. 26
Poynter Institute, The 56
Prosolvia Clarus AB 36
Sarrus Software Inc. 64
Sellen Construction Co. Inc. 8
Silicon Graphics Inc. 26, 36, 44
Snickleways Inc. 64
Sprint PCS 8
Staples Inc. 14
Sun Microsystems Computer Co. 44
Sun Microsystems Inc. 26, 44
Superscape Ltd. 36
Takshele Corp. 36
Tandem Computers Inc. 64
Teldor Wires and Cables Ltd. 36
T/Maker Corp. 14
Virtual Vineyards 50
Visa International Service Association 14
WebFlow Corp. 44
Wells Fargo & Co. 14
WildKat Entertainment Ltd. 8
World Wide Web Consortium 8, 16

Advertiser Index

American Power Conversion 49
Apertus Technologies Inc. 57
Bluestone Inc. C3
CIO Communications Inc. 63
Computer Associates International Inc. C2
Genuity Inc. 23
Hewlett-Packard Co. 11
IBM Corp. 20, 42
Information Builders Inc. 17
Internet Commerce Expo 61
Ironlight Digital 13
Lotus Development Corp. 32
Microsoft Corp. 5
Mortice Kern Systems Inc. 25
Portfolio Technologies Inc. 41
Sarrus Software Inc. 35
Silicon Graphics Inc. 3
USWeb Corp. C4, 5
UUNet Technologies Inc. 19
WebMaster Inc. 59

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Continued from Page 64

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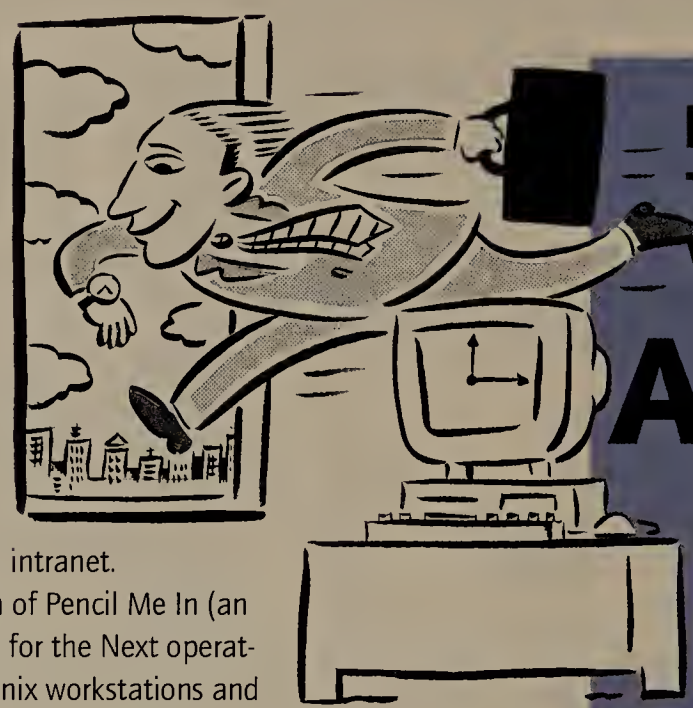

Everyone is excited about the Web's ability to bring people together in real-time (see "The Joys of Togetherness," Page 44), but the whole thing falls apart unless you can tell folks where to be and when to be there. Sarrus Software Inc.'s new Pencil Me In product lets employees schedule their meetings—virtual and physical—over an intranet.

Because it is Java-based, the new iteration of Pencil Me In (an earlier version of the program was developed for the Next operating system) is equally happy on PCs, Macs, Unix workstations and network computers. The tool lets users schedule people and places (e.g., conference rooms) as well as other resources in the same operation.

In addition, Pencil Me In allows users to work with live calendar data as opposed to the snapshot information provided by personal information manager and LAN calendars that can be out of date the moment it is posted.

For more information, schedule a time to visit *www.sarrus.com* or call 415 343-9111.

A BRIGHTER FORECAST

Anticipating demand isn't child's play, as the recent Tickle Me Elmo and Beanie Babies fiascoes make clear. Smart forecasting is a critical part of keeping inventories at the right level at the right time, and Logility Inc. is trying to make the process smarter by moving it to the Web.

Logility's argument is that accurate forecasting requires input from multiple players—remote users, suppliers, distributors and salesfolk—and that the Internet and extranets are often the easiest, cheapest way to connect all those links on the supply chain. The company's new Resource Chain Voyager allows companies to track demand across widely distributed organizations; ensure timely, automatic replenishment; and incorporate supply chain constraints into their planning.

Resource Chain Voyager consists of two modules. One manages demand by letting customers check forecasts and trading partners revise inventory goals, among other functions. The other handles the supply side via inventory consumption modeling and order review, approval and tracking. For more information, point your browser toward *www.logility.com* or call 404 261-9777.

DOING IT THE HARD WAY

As the number of Internet transactions increases, so does the need for strong cryptography—and with it, the load cryptography places on servers. At the same time, companies need their servers freed up to perform the aforementioned increasing transactions.

One solution to that Catch-22 is to move the security function from software to hardware—the approach being taken by Atalla, a division of Tandem Computers Inc. The company's new PayMaster/PCI ISP and Websafe2/PCI ISP products were designed to manage the cryptographic requirements of the Secure Electronic Transaction protocol and can perform up to 50 public-key encryption operations per second.

In addition to improving performance, going the hardware route improves security, according to Atalla. Because software-based products decrypt in unsecured memory—displaying keys and algorithms in readable form—they leave data vulnerable. Atalla's PCI-based products handle security functions without exposingdata, ensuring the confidentiality of payment and order information. For more information, visit *www.atalla.com* or call 408 435-8850.

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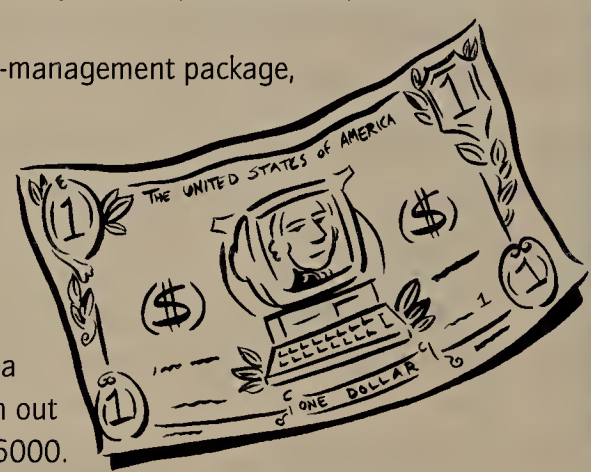
MERCHANT MINDED

Last year, Snickleways Interactive snagged considerable attention for the role it played in Fruit of the Loom Inc.'s celebrated Activewear Online system, an innovative project for managing distributor relationships. Now the company with the odd-duck name has several new products that tackle Internet commerce from a merchant-centric point of view.

Snickleways' order management system, ComForce, offers end users a multimedia catalog and the chance to view product availability and pricing in real-time. The benefit for sellers is that usage and other reported information is tailored for their needs, not their webmasters', allowing them to quickly create specials and update sites in response to the latest sales trend.

Digital Cockpit, the company's content-management package, is also aimed at business users rather than technical users. The product provides marketers with information on which vendors are ahead and why, which products are moving fastest and which sales opportunities have been missed



Snickleways also offers MerchantView, a tool for sales and promotions. Check them out at *www.snickleways.com* or call 212 366-6000.

Continued on Page 62

FOREVER EXTRA

A year ago, people using the word "extranet" did so somewhat sheepishly. Today these semiprivate networks have become the next big thing in business-to-business relationships. And vendors—never far behind the buzz—are responding with extranet-specific products, such as the recently released PFN Continuum from PFN Inc.

At the most basic level, Continuum allows organizations to connect their intranets, whether they be local, national or global. But the tool does more than simply let employees from different companies access each other's stuff. It also handles information management—integrating news and data from multiple sources; supporting one-to-one, one-to-many and many-to-many communication; and providing permission and security features that make routing proprietary information among intranets somewhat less of a minefield.

PFN's first customers are Wall Street companies building systems that tie them to buyers, sellers and other market players. Pricing is based on system configuration and starts at $995 per month per node. For more information, hike over to *www.pfn.com* or call 617 494-9980.

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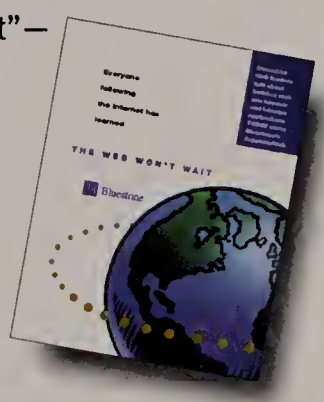

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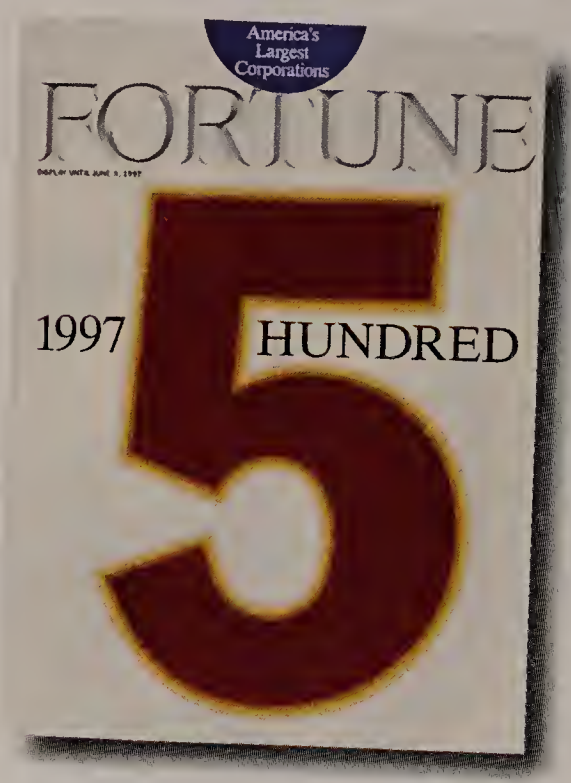

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